Vol. VI. MARCH 1922. No. 3

—THE—
MADRAS FOREST COLLEGE MAGAZINE.

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Edited at
COIMBATORE.
Madras Presidency.

Published by the Principal, Madras Forest College.

COIMBATORE,
Printed at The Electric, Printing Works.

The Madras Forest College Magazine.

Published Quarterly.

Subscriptions

Subscription per annum Rs. 2/-and an entrance donation of Rs. 2/-for students of the College.

Rangers, Foresters etc.,—same terms as students. Assistant and Extra Assistant Conservators—Entrance donation of Rs 5/-and an annual subscription of Rs 2/-

Other Officers—Entrance donation of Rs. 10/-and an annual subscription of Rs 2/-

The *September* Number being the *first* issue of every volume, or, year, of the Magazine, will be sent by V. P. P for Rs 2—2—0, the payment covering all four issues of the year and the Registration fee for the V. P. P.

It is not intended that the magazine should be run at a profit so that as our subscribers increase. the magazine will be issued in a more attractive form. More illustrations, will then be possible.

It is the aim of the management to run the magazine for the Ranger-class (including Foresters) and mainly by their contributions. Correspondents are needed to supply suitable matter to maintain the magazine on these lines We feel confident that this appeal will not go in vain. There must be a number of our readers who have something of interest to write on.

Subscribers are requested to inform the editor of all changes of address, and communicate with the principal by name in the event of copies not being regularly received.

Obtainable from the Business Superintendent,
Madras Forest College Magazine,
Lawley Road, P. O., Coimbatore.
South India.

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The Teak Tree.

TECTONA GRANDIS, LINN. (VERBENACEAE.)

(Third essay for the Indian Forester Prize for students of 1919-1921 Division.)—K. Venkatesan.

Distribution :—

THERE are two areas (1) Peninsular area and (2) Burma area In peninsular area it extends north as far as the Narbada and Mahanadi and occurs scarcely in Orissa and Northern circars. It is seen abundant in the Chanda district of Central provinces, North Canara, Bombay, Wynad forests in Benni and Mudumalia, North malabar division, Anamala hills and Travancore. It also occurs in the Godavary district near Badrachalam and agency tracts. It is also seen in the Nallamalais of Kurnool and Cuddapah but the growth is not good as in other places. It is also found in Mysore. In Burma it is found in Siam and Java

Vertical distribution :— In western India it is found about 200 ft. elevation, for instance at Nilambur. In the Anamalais up to 2500 ft In Wynad and Burma it ascends up to 3000 ft, but at this latter height the trees are stunted.

Localities :—

(*a*) *Climate*:— Teak does not stand frost but it thrives at temperatures ranging from 60° to 87° with a mean temperature of between 72° and 81° F. H. It requires about 50 inches rainfall in the year and grows well with a considerably heavier rainfall.

(*b*) *Soil*:— The soils best suited to Teak are a rich, red, sandy clay mixed with stones or a dark alluvial sand. Teak will not grow well if the drainage is bad as on stiff laterite. If flooded for many days at a time the trees will sicken and die. Teak is a light demander and can not grow in close proximity with other trees nor can it bear to be over topped or crowded by them and the over drip. Hence its absence from ever green forests.

The best soil for Teak plantation is a sandy clay on the banks of a stream, the ground should slope gently towards the stream. If too steep the soil on the top of the Hill is apt to be different There are other soils, such as a brown surface soil with rather a retentive sub soil of yellow clay. In such a place Teak grows well.

When inexperienced people see Teak that has been cut over and throwing up large shoots with large leaves, they imagine at once that the soil and climate are suitable for teak and that some primeval forest of teak once existed and had been utterly destroyed. The truth being that both soil and climate were incapable of producing good teak and at the best stunted specimens grew there which never contained 5 cubic feet of marketable Timber.

A notable example may be found near Musna gudi, at the foot of the Segoor Ghat, many teak trees are seen bordering the road with leaves as large as finest trees have never produced and never will produce 5 cubic feet of good Timber. Yet 10 miles west as the crow flies fine teak will be found, so great an alternation of climate does 10 miles produce in this locality, whereas 10 miles further in other places may not produce any change whatsoever.

At Nilambur it is remarkable to see how enormous is the growth of the trees on the river bank and how the size gradually receded to one third on the top of the low hills especially where laterite cropped out on the surface showing of what vital importance is good soil to a teak plantation.

The usual soil in Wynad is a very dark brown surface soil with rather a dark yellow sub soil. In this teak grows well.

Teak can not be grown in amongst bamboos nor indeed in any other forest trees. It is a fallacy to suppose otherwise and whenever the contrary has been observed, it is due to the fact that the trees were established there before the bamboos appeared.

Shape and developement:— The teak has little tendency to branch low down. It usually has a fairly clean, straight bole surmounted by a large crown. The young sapling has a very strong terminal shoot, enabling it to pierce over-head cover to obtain light. It grows very fast when young. The mode of growth of the teak tree depends very much on its situation, such as at Nilambur, for instance, where the climate is exceedingly forcing, the trees are drawn up to a very great height. At forty years of age, being something like 106 ft. high, after which age their vertical growth is slow and the boles begin to fill out. In Wynad owing to the difference of climate the growth is much slower, probably not quite two-thirds of the above rate. In the Anamallais the growth is between that of Nilambur and Wynad and at the same time the trees attain a gigantic height In 1914 one teak tree felled, about 22 ft. 7 inches in girth at breast height with an age of 601 years and its yeild was estimated about 1200 c. ft of Timber.

Reproduction:— Teak flowers during rains and the fruit ripens in the following cold wether and falls on the ground on the following hot wether when the tree is leafless The fruit is a hard nut covered with a papery cover with hairs. It contains two or three fertile ovaries. The early showers of rain are very essential for germination an account of alternating wetting and heating. The seeds keep vitality for a long time, sometimes 3 years. Germination succeeds well if the seed gets sufficient warmth and moisture to rot the corkey outer covering and enable to open the hard-nut. The seed splits in at two or three places and through these cracks the radicle comes out and after the radicle grows deep into the ground the walls fall off and the centre hard part remains in the ground; when the seedlings are come up in the forest they must be weeded throughout the rains and following year in succession. Unless direct light is given over head the seedlings can not develop and die off or remain stunted.

Teak coppices vigorously up to a considerable age.

Character and Composition:—In the natural state teak rarely shows any tendency to grow in a pure crop. It forms only a small percentage of the stock of the deciduous forests in which it is most commonly found. It is generally found in company with Rose-wood, Pterocarpus marsupium, Schleichera Trijuga, Xylia, Terminalia tomentosa and belerica, Gmelina arborea, Bridilea retusa, Adina cordifolia, Styphegyne parvifolia and Bamboos.

In one of our tours this year I measured the sample plot laid out by the Madras Forest College students at Waliyar and found the perecentage of teak to be 68, per acre comparing only with the two species (1) Rose-wood and (2) Pterocarpus Marsupium.

Methods of Treatement :—Teak when grown pure like the plantations of Nilambur offers little difficulty to be worked over The best method suited for such plantations is clear felling and restocking the area artificially by transplantings. When it is mixed with other species and where the greater part of the crop is unsaleable the only method that can be practicably worked is Selection method combined with concentrated regeneration fellings.

Girdling:— Girdling is the real cause of teak being brittle and devoid of oil, for if the sap descends by the capillary tubes so does the oil. That if a tree is felled and lies horizontally for years the oil does not escape but the sap is evaporated out. It has been a well known fact that Malabar teak is superior to Burma. The chief reasons being that Malabar teak has retained its oil, whereas Burma teak had lost it.

Sowings and Plantings:— The seeds should be collected from trees with a clear stem free from ,decay and of vigorous growth. February is the best month to collect in.

(*a*) *Preparation of Nursery beds*:— Select good free soil and dig 12 inches deep, removing weeds, roots, and stones The soil should be reduced to a fine powder and the nursery levelled Then prepare beds 2½ ft × 12 ft with one foot space between each bed and its fellows. Sowing must be done from 10th to 15th April. Before sowing steep the seed for 48 hours in water. After sowing the beds must be watered daily copiously. Then the seeds will germinate in from 10 to 15 days or 20 days or more according to the freeness of the soil. Watering may be lessened as the plant strengthens but sufficient moisture must be maintained till the monsoon sets in; when the plants will be from 4 to 8 inches high they will be ready for planting. The site for planting should be selected and all the tree growth thereon should be clear felled After removing the timber if any all the debris must be burnt off. After the soil is softened by rains, line and mark off the pits. The required distance apart from 6 to 7 feet answers well and the pits dug 10 to 12 inches Cube and filled in as dug with earth slightly raised around tops.

(*b*) *Planting*:— The seedling should be put well down in the pit taking care the tap root is not twisted and turned up. Planting should be done after the soil is well saturated with rain. First week of July is the best season; plantations at Nilambur are the instance of how plantations of this species may be raised successfully.

Injuries to which it is liable:— Teak has some enemies in addition to fire. Sometimes mealy bug attacks the tap root when the seedlings are in the nursery bed. The cure is plenty of ashes in the beds. Elephants sometimes destroy the trees by walking through a plantation. Sambar also, rubbing the horns against the young trees do considerable damage. Monkeys jumping from tree to tree break the tops. Much loss is caused by wind-storms which snap off the finest trees especially just after the thinnings of a plantation. Teaks suffers very badly from defoliation by two kinds of defoliators called:

(1) Hybloea peura (2) Pyrausta Macharalis. The first one eats all the lamina and leaves only the mid-rib The second one skeletonizes the whole leaf. Teak saplings and poles suffer from borers. The caterpillar of a Moth, Cassus cadamboe, bores a hole into the stem generally within a foot of the ground and then tunnels downwards. I was shown one of this sort at Kargudi last year while on excursion with my Imperial Instructor. The only remedy is to cut back the pole down and let it throw up a new shoot.

Part II Utilisation.

Indentification of tree:— Teak is a large deciduous tree often fluted near the base Bark thin fibrous, light brown or grey, peeling off in long thin strips Branchlets quadrangular and deeply channelled with a large white pith Leaves opposite decussate, simple, ovate-elliptic or obovate, entire, thickly coriaceous and rough above. Inflorescence a large di-or tri-chotomously branched cyme bearing bractiate terminal panicles 2-3 ft, long. Flowers regular and sweet scented.

Identification of timber:— Heart wood is strongly scented when freshly cut and dark golden yellow, turning dark brown afterwards Annual rings distinct Medullary rays moderately broad and fairly mumerous.

Utility of timber: —Weight 45 lbs. and P. 600. The uses of teak are innumerable, for there is hardly any purpose for which timber is employed to which it can not be put. One of the most valuable qualities of the wood is that once seasoned it does not split, crack, shrink warp or alter its shape. It works easily and takes a good polish and is of handsome appearance. But its principal value is its great durability which is due to the essential oil it contains which prevents white ants from attacking it. For house building purposes it is unsurpassed. It is more largely used than any other wood, for ship-building as the oil does not allow the iron bolts to take rust.

"AN ATTEMPT."

Forest Life in India *(continued)*

IV ELEPHANT CAPTURING.

(Reprinted from 'The Varsity' May 27, 1913.)

The most humane and at the same time least expensive method of catching elephants is by digging pits for them. This is the method we always adopt. The pits are arranged in groups, round the junctions of the big elephant paths These are fairly numerous in elephant jungle and are very well marked. The usual method is to arrange them in triangles round each path a little way from the junction. At the apex of the triangle one pit is placed, and this is close to the path, but not on it, as to disturb the growth actually on the path would indubitably arouse the elephants' suspicions. At each end of the base of the triangle and about 5 yards to 10 yards on each side of the path another pit is placed The pit is 12 ft. to 15 ft. deep, and about 12 ft. square, and is filled up with brushwood to a height of 6 ft. from the bottom so as to break the fall of the elephant. It is covered over with thin bamboo laths and a light sprinkling of earth and then grass or bamboo leaves or whatever material is present on the ground in the vicinity.

This covering has to be renewed daily, as it dies and turns a different colour to the rest of the ground covering, or gets blown away. If the pits don't look natural the elephants become suspicious at once and they are very cautious. When they think there is any need for care—as for instance when going down a steep hill or when walking over a bridge or crossing a river full of loose boulders—they never take their next foot off the ground till the one already raised has found a firm foothold, and they never have less than three feet on the ground at once. In fact, their one pace is a walk, though when they want to they can walk faster than an average man can run. So it is necessary to have the pit covering very fresh and carefully laid, and for this purpose, to every twenty pits or so, a forest guard is told off, and under him one or two 'pit watchers' work. It is the duty of this 'pit' guard and his watchers to go round his pits every morning and every evening to see if there has been a fall, and if so to report it at once so that the capture may be taken without loss of time—and also to arrange and renew the covering of the pit.

The District Forest Officer inspects the pit when he is touring in the neighbourhood, and only last year one of the more senior of the 'D. F. O's' in the province had rather an amusing experience while on this work. He was inspecting his pits and was dissatisfied with the condition of the covering and was explaining that it would not do at all; that elephants were by no means fools; and that even if they were they couldn't be expected to fall into such ill cancealed traps. Then he moved off to see some more, and...fell straight into one of the pits he had just been cursing! However, the brushwood bed was in its place and he broke no bones.

When an elephant "falls" it immediately sets up a trumpeting and squealing that can be heard for a mile or more, and often the whole heard joins in. If any one is near enough to hear this, word is immediately sent for the tame elephants, and five or six of the best are marched off to the scene of action at once. But even if no one hears the noise they make after the fall, the pit guard will report it at latest within twelve hours after it has taken place, so that no unfortunate animal can be left for long in what must be rather a terrifying position. Directly the fall is reported, then the tame elephants with their mahouts and cavadies are marched off by the Deputy Ranger who is in charge of them to the pits where the "fall" has occurred. They take with them the necessary ropes—which are made of twisted fibre and are specially prepared by the elephant men and kept in readiness—and chains, as well as axes, spades etc. Some twenty or thirty coolies are also taken, and directly the scene of action is reached these latter tall to work felling trees and cutting them up into billets about 2 ft to 3 ft. in length; these are thrown into the pit until it is nearly full, thus gradually raising the elephant, who climbs up on to the pile as it grows and tramples it down to one level. When he can get his forefeet well on the edge of the pit he can scramble out, so a little before this state has been reached the filling up of the pit is stayed until the elephant is properly 'roped' All this time the roping has been going on, and other coolies have been carrying water in large bomboos and pouring it on the captive, as it is continually fighting to get out of the horrible trap intowhich it has fallen, and to, kil, the billets which are thrown in, and it gets very hot and tired. Pouring water on its head and back is very refreshing to it, and sometimes, soothes it and keeps it quiet for some minutes.

The 'roping' is the difficult part, and with a troublesome elephant this process may take three or four hours. Frist the neck-rope has to be fixed. For this purpose the height of the capture in the pit is measured as this is approximately the size of its neck and a peg is spliced in to the rope at this point and a slip-knot tied above the peg. This slip-knot is then held horizontally over the pit on four bamboo hooks, and the elephant is enticed into putting up his trunk through it by dangling a handkerchief or bit of white cloth over it to attract its attention; it invariably reaches up its trunk to seize and destroy the bit of cloth, and the slip-knot is then run down its trunk and over its head and pulled tight. The peg which has been spliced into the rope prevents it from slipping too far and strangling the elephant, to fix it firmly and prevent its slipping back again it has now to be tied in place with string, and this is the dangerous part of the business, The most senior mahout usually does the work, and to him the biggest reward is given afterwards. He has to be down and lean over the edge of the pit to tie the slip-knot firmly with string, while the elephant is naturally fighting, like a devil gone mad, to get rid of the horrible strangling thing that has twined itself round its neck. It seizes the rope in its trunk and pulls part of it into the pit and tramples on it; it gets it against the side of the pit and charges it like a living batterping-ram; and occasionally it manages to pull it off when the whole process has to be gone through again, If, however it does not get rid of the rope after some five or ten minutes' strenupus fighting and stands still, then water is poured on its head from above, the rope is gradually pulled up taut again, and the mahout leans down and with deft fingers ties the strings to keep the knot in place, while his relations—mere friends are not sufficiently trustworthy—hold him by his loincloth, ready to pull him back with a jerk if the elephant sees him and tries to catch hold of him, and others stand with sharpened bamboos ready to prod its trunk if it makes such an attempt. When at last this knot has been firmly tied another rope has to be fixed to one of its hind legs. This is usually not so difficult, as the elephant has by now got tired and sulky—as well it might. The leg rope is a tapering one, and it is tied to a bit of cord, and this to a bit of string. This is passed round the elephant's leg in the following way: it has a loop tied at the end of it, and it is fixed in a thin cleft bamboo by which it is pushed down into the pit and passed behind the elephant's leg while he is standing sulking in a corner of the pit—but, if possible without touching him. Another bamboo with a hook in it is then used to look the loop in the string, and it is pulled up rapidly, pulling the cord and then the rope up through the elephant's legs. Then a slip-knot is tied and pulled tight, and this is worked down the elephant's leg, by pushing it with sticks, till it reaches the ankle; its foot is then lifted up as high as possible, and, while the elephant is held still by the rope round its neck the mahout again leans over the edge of the pit and ties the knot in place with string. The roping is now complete. The two biggest tame elephants are brought forward and one of the ropes is passed round the body of each and fastened, and the pit is finally filled up with billets. The captured animal scrambles out at the first opportunity and makes a rush for the jungle,, only to be pulled up with a jerk when it reaches the end of the rope; it makes a dash, in the opposite direction, but is again stopped by the other rope. Then two more tame elephants are marched up, one on each side of the capture, and they reason with him and prod him and push him on, and so they more off in procession in the direction of the nearest Kraal. This is an enclosure about 20ft by 20ft built very strongly of good stout young trees, and well floored and drained, and here the newly-captured elephant has to remain until it is tame. It is well fed and supplied with plenty of water, and its mahout, who is appointed at once, is always with it. Tame elephants are continually wandering about near it, working, feeding, and bringing in new supplies of fodder for their captured friend; and it is not long before the prisoner is sufficiently tame to feed from its mohout's hand, then for him to go inside the Kraal with it, and finally to have chains-for hobbling-attached to its ankles, and to be brought out under the escort of one or two tame elephants for exercise and for grazing. The length of time during which an elephant has to be kept in durance vile varies greatly. It is usually not more than five or six weeks, but may be as much as three months The older elephants or the very young ones are the easiest to tame, the half grown ones usually the most difficult. When they are brought out they are taught first to come when called; then to follow their mahout, to pick up a stick, a leaf or anything they are told to; then to kneel down, which is usually a difficult matter, and finally they are broken to harness and are taught to pull and lift logs and to perform their various other duties.

Great care is taken with the elephants of the Forest Department to see that they are taught by kindness and not by fear. Punishment is occassionally necessary—as is also the case with children and school-boys—but it is very rarely allowed; and ill-treatment, if discovered is visited with direst punishment. If an elephant s savage it is, as likely as not due to cruelty when it was first captured or afterwards when in working I have known a savage animal whose mahout used to beat it, become quiet and friendly within a few months of being under a good man who treated it well. When they have once been tamed they have a very happy life, provided the District Forest Officer takes the trouble to see that they are well treated; they have plenty to eat and not very much work, and I have never known a case of one of them permanently rejoining a wil herd.

CHOKRA,

Lumbering in the Madras Presidency,

By C. S. Martin, Consulting Forest Engineer to Indian Government

(SPECIAL CORRESPONDENCE TO THE *Timberman*)

The timbered area in Madras under forest Department control amounts to 19,615 square miles. Besides this, there are many thousand square miles of forest privately owned which are either deteriorating rapidly under working for immediate profits only, or cannot be worked at all, due to lack of any organised transport system

The Madras forests are in many cases very fine bodies of timber, often extending for many thousand acres of unbroken forest. One such tract, known as the Agency Tract, consists of over 400,000 acres of solid forest.

The stand varies from about 10 tons of merchantable timber to the acre to over 200 tons to the acre, making in many instances the finest sort of logging chance

The more important timbers at present are teak, sal, Mesua or ironwood, Hopea, poon, Bombax, and many others less well known. Among less known species is one which will eventually be recognised as one of the world's finest timbers. This is Gluta, which grows to a large size and is found in very considerable quantities in the Tinnevelly district. This wood is of a much richer colour than mahogany, works easily and has the lasting qualities of cedar—truly a beautiful wood, which will be in great demand when a steady and dependable supply is arranged for, and when it becomes known in continental markets There are also rosewood, ebony and sandalwood, for which there is a great demand, but which occur in relatively small quantities and sizes and are not classed as a rule, among the timber trees. Sandalwood sold last year in some of the public auctions at over $ 500 per ton of 310 feet B. M.

Profits Deemed Incidental.

In the past the energies of the Government have been exerted in the conservation and organisation of this large timber resource. While the profits received from the management of these forests have returned a large profit to Government after all the expenses of administration and management have been met, this profit has been to a large extent incidental rather than fundamental The supply of firewood to the surrounding country has been of greater economic importance than have the strictly lumbering operations.

This stage is passing however, and the sudden and imperative demands which grew out of the war have awakened thinking men to the pressing need of developing these natural resources to a point where the state can realise on the potential value of these holdings while constantly improving and enlarging on their productivity

While treated sleepers, box shook and Swedish pine are now imported in considerable quantities at competitive rates, there are large reserves of even better woods for the same uses lying within 30 to 50 miles of existing railways All that is needed is organisation and organised transportation to make these large supplies available. India is now severely crippled in a business way by the large perponderance of imports over exports As far as timber and timber products are concerned, she can well tip the balance the otherway. It all depends on the far-sightedness and ability for clear thinking shown by the members of the new legislative Assemblies. The future of the country lies in their hands They have the opportunity to prove to the world their capability of directing the destinies of a great country, as no policy of development can succeed without their hearty and intelligent support

Logging Operations at Dhoni.

Aside from the out-turn of logs from the Nilambur teak plantations and the product of the new Government-owned saw mill at Russelkonda, the only logging operation of any size is that at Dhoni, near Coimbatore. Here a purely logging operation has been started, using current methods of exploitation, and due to the energy and ability of the men in charge of the work has proved successful. By the end of the second year it will have paid back to the Government all the invested capital with interest. Were the methods employed suitable for continuing the work beyond local areas, there would not be so much interest displayed in more modern appliances and organisation As its proposed to carry on this production over an area 70,000 acres, in extent, much of which lies in what has always been regarded as absolutely inaccessible country, the Government has asked for a plan by which the entire area may be profitably worked. We will take up later, however, and explain current methods of logging, which may be of interest to readers of *The Timberman.*

The trees are felled with native axes, the fallers hacking around the trees at any convenient point until it toppies over. No effort is made to direct the fall and as much of the timber is very large, with crowns, the resulting breakage and damage to smaller trees is very large.

Next the trees are chopped into logs with axes, a slow and wasteful paocess, which is further enhanced by cutting back the end of each log about 18 feet in a sort of egg shape to facilitate dragging. Drag notches are also cut into the log in which to attach a chain for hauling. This wastes at least a foot of the log.

Dragging Logs by man power.

We next have from 10 to 20 nearly naked coolies who appear armed with sticks to use as levers, and a manila rope which is inserted in the drag hole. The log is now supposed to move to the drag path through a process of chanting, and shouting, the leader giving the verse, the gang coming in strong for the chorus Thus translate freely it would go something like this 'She is hung on a root" Gang. "Heave, ho." "Try it again." "Heave, ho." "Pull hard you beggars." "Heave ho," etc, Meanwhile should the log be pretty firmly held up, the process continues, no one worrying much whether it is moving or not. Why worry? Every one is working hard and quite happily. I suppose that the average speed of this process is about one foot advance every five minutes. But please note that eventually the log reaches the drag path and all is well

Then comes the elephant or the patient buffaloes, which drag the log to the top of the nearest slide or chute, down which it goes to another drag path.

Eventually by this process it reaches the lower log depot, where it is slang on two-wheeled bullock carts which take it to the railway depot, five miles away. Here it is loaded on railway wagons by the use of a hand crane, and proceeds to the Kolar Gold Fields, which contract for the entire log out-turn of the operation.

The annual possibility of this logging unit is about 10,000 tons per annum or 3250 M feet per year.

Machinery to be employed.

In order to increase out-turn and cheapen production it is proposed to use one or more yarders, eventually one road donkey, Holt caterpillars for dragging, and a heavy-duty road tractor for the longer hauls. In course of time it is hoped to have a meter guage railway to the foot of the hills, which will further cheapen transportation charges

The prospects for a long-time operation with constantly increasing out-turn and with desirable profits, are very bright, and it is hoped to get the project under way as soon as an organisation can be developed to handle it.

This same story could be repeated all over the province, and when the total possibilities are summed up we get some almost incredible figures as to the future value of these forests to the presidency.

Minor Species to find market.

I can see the finer timbers sold in world markets as Madras products, the teak, sal and Mesua now relied upon by the railways for sleepers. supplemented by many other species of which we know little at present but which under treatment will serve equally well, releasing the teak and sal for other uses The other species now known as jungle woods, will be made into three-ply boxes, pulp and other minor products Water power will be developed and a large number of new wood working industries will spring up. The whole prosperity of the country will be enhanced and a new example given the world as to what is possible under forest management which is resolved to develop its utilisation possibilities to their fullest scope

To accomplish this we will need modern saw-mills equipped with kilns and treating plants; an organisation developed for the handling of the timber, with Indians trained for this special line of work as they are now trained in sylviculture; a development of markets by advertising our woods and insuring a regular and dispendable supply; an experisment station where the seasoning and treating of Madras woods can be taken up and commercial problems worked out in co-operation with the business community; and last but not least, a widespread educational campaign to make the people familar with what we are doing what we expect to accomplish, and with the steadily increasing benefits occuring to the ordinary citizen through these activities.

And I must say that taking into full account all discouragements and disappointments, I believe that all these things will come to pass and that Madras will take her place as among the progressive, enlightened peoples of modern times.— —*The Timberman.*

Forest Utilization in North India.

(a) *Wood Working Institute, Bareilly.*

1. In Bareilly is an experimental wood-working Institute which was originally purely educational, but has now greatly developed, and combines education with what is really neither more nor less than research work.

It consists of a small saw-mill, the outturn of which feeds the other concerns; a factory for solid turnery, for the manufacture of parts of furniture, tool handles, brush backs, boot lasts, etc., for which there is a big demand; another factory for the manufacture of bobbins suitable for the cotton and jute mills of Bombay and Calcutta; and two Tieman Kilns, for the artificial seasoning of timber, which have recently been installed, and of which one is already working.

2. The value of the Institute is very great, and its objects are threefold:—

In the first place, it is a training ground, where expert cabinet makers, carpenters, and machanists are educated. Some 200 are continually employed and a considerable number of these complete their training every year, and get excellent positions on good pay varying from about Rs. 90 up to Rs. 250 or more per mensem. As the great majority of the students come from the poorer classes the social and industrial benefit to the Province generally is obviously considerable.

In the second place, the fact of training such a large number of men in wood working industries, who all learn, and greatly appreciate the value of the local timbers, in itself creates an ever-widening demand for those timbers, and so contributes to the prosperity of the country as a whole.

And thirdly, experimental work done on various timbers is of the greatest and most far reaching importance – an importance that is, at present, little realised even in the Province itself To mention but two of the valuable results obtained:—The timbers, *Adina cordifolia* and *Anogeissus latifolia* have been shown by the experimental work done at the Institute, and at Clutterbuckganj to be especially suitable for the manufacture of bobbins and tool handles respectively. A big demand for both the timbers has arisen and the prices now paid for these woods is far higher than it was before. As regards *Anogeissus latifolia* the tool handles manufactured have been sent far afield, to Australia, England, and other countries, and the timber has been tested by experts, and certified to be considerably stronger than English Ash

3. Such experiments are continually in progress at the Institute, and suitable uses are being found for various little known or little valued timbers These experiments include the testing and trying of such woods for dry and wet cask making, for the making of cotton reels, tool handles, toys and various types of timbers to varying degrees of humidity, which is now being taken up for the first time.

4. Apart from these indirect benefits, the value of which, however great, cannot be expressed in figures, certain branches of the Institute are actually run at a financial profit. For instance the profits on the Turnery, even on the small uncommercial scale which is possible in an experimental establishment of this sort, have, this year, amounted to 31% on the capital expenditure.

(*b*) *Clutterbuckganj*.

5 At Clutterbuckganj, 5 miles outside Bareilly are established the big saw mills, bobbin, and solid turnery factory, which form part of the United Provinces Utilization Circle.

6 The rosin and Turpentine factory has been established for some years, and has only comparatively recently been transferred to its present position. It produces a very handsome annual net revenue for Government, which is now well over two lakhs, and appears to be increasing with fair regularity.

While on this subject it will not be out of place to quote the figures for the Punjab Rosin Factory at Jallo. In 1919-20 a net revenue of Rs. 398, 350/ was made, equivalent to a rate of interest of 396%. In 1920-21, owing to the general trade depression, it showed profits amounting to only 164.9 %!

7 To return to Clutterbuckganj, the saw mill was erected under great difficulties, largely as a war-measure, at a time when expert supervision was of course unobtainable. The machinery is, therefore, not of the latest type, and the lay-out might be, – and probably very shortly will be, – improved.

Moreover, the demand to meet which it was erected, namely, that of box planking, to be sawn largely from Chir Pine Sleepers for the Munitions Board, is now no longer existant, and the general demand for this material is not yet fully developed. Had war conditions continued for a short time longer than they did the whole capital cost of the mill would have been paid off. As it is, it requires bringing up to date and altering in one or two details so as to meet existing conditions when it will with little doubt become a very paying concern.

At present, though it is actually run at a loss it serves the purpose of feeding the bobbin, and solid turnery factory. This latter has been only recently fully staffed with the necessary expert supervision and is showing marked progress. If required the papers regarding the engagement of these experts, *on commercial terms,* can be obtained from the Inspector General of Forests or the Government of India. Owing to initial mistakes, hardly altogether avoidable at the commencement of a big enterprise of this kind, material was put on the market which was not up to standard, and not exactly what was required.

8. These mistakes have now been rectified and the outturn is of the very highest class obtainable, and ready markets are opening up in Calcutta and Bombay which will easily absorb the whole outturn of the factory, and still remain unsatisfied. The mill Manager informed me that the present working justifies the expectation that within two years from now, the saw mill will be showing no deficit and the Turnery and bobbin factory, which it feeds, will be showing a profit of not less than 25 % net. This can hardly be considered as otherwise than very satisfactory.

As soon as the financial position of Government allows of their making certain proposed alterations in the lay out and equipment of the saw mill that too will without doubt be run at a considerable profit.

9. However, apart from the purely financial aspect, the works at Clutterbuckganj have a far greater value *in that they serve as a demonstration of the possibilities of industrial enterprise in India, in connection with the forests.* Very large quantities of timber, both in the manufactured and the raw state, are annually imported into India, largely because the value of the indigenous timbers for the various purposes in view is unknown. Moreover when the value is known funds have not hitherto been forth coming to embark upon schemes of exploitation and manufacture. This seems to be essentially a matter in which the State should make the first move, provided that, after careful examination the schemes seem likely to pay.

10. Our vast timber resources, and the great wealth that lies in our forests are at present realised only by Forest Officers, and no

indeed by all of them. So far from being an importing country India ought to be exporting many crores worth of timber per annum, and it is only due to the fact that our timbers are little known, not only throughout the world, but even in India itself, that this is not now the case There are markets crying to be supplied in Mesopotamia, Palestine, South Africa, Egypt, which would absorb readily all our inferior timbers; and for our very excellent hard woods there is an enormous and ever increasing market in Europe and America.

A very eminent American gentleman, who is now touring in India in connection with the timber trade, by name Mr Mc Giffort. assured me that 80 % of America's hardwood forests had of comparatively recent years been destroyed, and that the demand for hardwood timbers was growing annually. Yet the yield of our Indian forests at present amounts to not more than 3. 1 cubic feet per acre per annum, and of our Madras Forests to not more than 1. 7 cubic foot per acre per annum which is clearly far less than the annual increment This state of affairs is solely due to lack of the funds necessary for exploitation. Indeed the potential value of our forests is so great that, were they exploited to their full extent, India would be one of the richest countries, and the Indians one of the most prosperous peoples in the world· Such works as those at Clutterbuckganj are for this reason of enormous value as they serve to demonstrate on a small scale what can and should be done on a really big scale by private commercial enterprise. One of the most eloquent testimonies to the world wide importance of the work that has been, and is now being done at Clutterbuckganj and Bareilly is the fact that what is, I believe, the biggest bobbin-making firm in the world recently realised that their supremacy was threatened by the competition they were likely to meet with in India as exemplified by the factory, small though it is, at Clutterbuckganj, and attempted, needless to say, without success, to get state protection for their industry Copies of the interview between representatives of this firm and the

Secretary of State for India, have been already sent to the Government of Madras)

11. Now representatives of this firm are in India looking for sites to erect factories where the supplies of timber are suitable and sufficient, and transport facilities good.

The demand for bobbins by the jute and cotton mills in India is so great as to absorb some 60,000 tons of timber per year. At present nearly the whole of this supply is *imported* in the form of the manufactured article.

(c) *The Madras Evergreens.*

12. To turn now to the application of these observations and facts to Madras. The present scheme for the exploitation of the Evergreen Forests in Malabar provides for the extraction of some 20,000 tons of timber per annum. Of this perhaps 20 to 30 % is well known timber for which a ready sale can be found The remainder consists of timbers which are at present largely unknown and untried, and unless we can find a sale for all of them, or at least 90 %, their extraction is unlikely to be a financial success. There is however very little doubt that there is a use for every cubic foot of the yield if we can find it.

13. In the first place if Messrs Wilson and Company, the bobbin manufacturers referred to above, could be interested in the scheme, it is probable that they would find many of these untried timbers of ours to be suitable for bobbin making, in which case they would no doubt consider the advisability of erecting a saw mill and turnery on the west coast in some convenient site, as for instance at Olavakkot or Calicut. Similarly the timbers of the Tinnevelly Forests from which the annual yield will probably amount to nearer 10,000 tons, may be found to be suitable for bobbin making.

14. Should Messrs. Wilson and Company, who, owing to their large experience, are the most likely people for the purpose, not be prepared to go into the business, some Indian firm might be sufficiently interested to do so As regards the sale of the timbers to any such firm we are in the strong position of having the Bareilly wood working Institute to apply to for information as to the correct market value of woods suitable for making bobbins, so that it should be unnecessary for us to sell at concession rates, nearly always an unwise plan.

Samples of these timbers were shown to the experts at Dehra Dun and the general opinion was that *Dichopsis elliptica*, and *Hemicyclia elata* and also possibly *Cullenia excelsa* and *Strombosia Ceylanica*, which form the greater part of the crop, would probably be suitable for making various kinds and parts of bobbins.

15. If however, as may be the case, these timbers are unsuitable for this particular purpose there can be no doubt that they are eminently suitable for either three-ply wood or sleepers Of the samples shown to Mr. Pearson at the Research Institute he gave it as his opinion that *Dichopsis elliptica*, certainly, and *Cullenia* and *Strombosia*, probably, would be easily impregnated and would be suitable for sleepers. He suggested that sample sleepers for testing should be sent to him as soon as the new apparatus at Dehra Dun is ready for use Such samples should be carefully stacked and air-seasoned for about six months before being sent to Dehra Dun The Railways have, it is understood, at the recent Railway Conference at Simla, agreed to accept the opinion of the Research Institute as to the suitability of various timbers for sleepers.

16. Again as regards the manufacture of three-ply wood all the samples produced of the evergreen timbers of Malabar were stated by Mr. Pearson to be suitable. The question of glues suitable for use in this country has already been thoroughly investigated at the Research

Institute at Bareilly and has been satisfactorily settled, and no difficulty need be anticipated on this score.

As, at present, three-ply boxes to a value of 5 lakhs of Rupees are annually imported into the Port of Madras, largely for use on tea and rubber Estates, it is obvious that the demand is present, and there seems to be no reason why it should not be met by Indian firms making use of Indian timber, instead of allowing the large resultant profits to leave the country as they at present do.

17. Even should none of these three proposals be feasible, as there is a very big demand for general purpose timber throughout the country, as well as overseas, as pointed out in para 10 above, we could certainly find a market for our outturn were we to saw to convenient sizes *and season* the converted material.

18. Artificial seasoning is expensive but would probably be advisable in the case of our more valuable species. For the others air seasoning, of the *converted material*, under roofed sheds, giving protection from sun and rain, would be all that is required. To get the best results from such air seasoning the timber should be converted *green*, and then carefully stacked in the drying sheds If green conversion is not possible the logs must be kept under water, in some form of log pond, till they can be sawn.

19. For any of these schemes a considerable initial outlay is essential. Should Government be unable or unwilling to sanction the necessary expenditure the question arises as to how the capital is to be raised The most desiarble solution of the difficulty is obviously that some private firm should erect the plant and purchase the timber from Government.

20. Private enterprise appears however to be shy of such ventures except on terms which Government should not, in the interests

of the taxpayer, accept. In that case it would be necessary for Government to put up a pioneer saw mill or factory in order to demonstrate the commercial soundness of the project.

We have examples of the success of such enterprises in the Resin Factories at Clutterbuckganj in the United Provinces and at Jallo in the Punjab, both of which show enormous net profits per annum, (vide para 6 above), in the small Bobbin Turnery at Bareilly and in the saw mill and the larger turnery at Clutterbuckganj, (vide para 6 above).

21. It has however been repeatedly demonstrated that no such project can expect to run with maximum efficiency unless it is managed on true commercial lines. A business Manager of experience on an adequate salary must be in control of the whole concern and it must be run on business lines, instead of under the present financial system which is not suited to such a commercial undertaking. Under this system it is impossible to make arrangements,—with any certainty of continuity of policy,—for future necessary devolopments, which must-frequently be foreseen five or more years ahead; it is impossible to guarantee the various conditions of contracts,—often extending over a series of years,—into which it is necessary to enter with other connected commercial concerns; it is impossible to control, and when necessary appoint and replace staff, etc., with the efficiency and promptness that is essential to the success of any commercial undertaking; and in fact in every way, under present conditions, a business managed by Government, and financed out of current revenue with a yearly budget of revenue ond expenditure, beyond which it is not possible to go, is so heavily handicapped as to make it a virtual impossibility for it to compete with any similar commercial business, or indeed even to show a fair annual return on the capital expended

22. It would appear that there are two practicable alternatives. The first is some form of co-partnership,—such as has recently been

initiated in the United Provinces by which private enterprise puts up a part of the necessary capital, Government's share probably being the stock of timber or other produce, already in the forest. By this method all the finanancial difficulties reterred to above are overcome and the concern can be run on thoroughly sound business lines. The main objections to this scheme are however:—

(1) that there seems to be no reason why Government should yield a share of profits to private individuals, as is necessary in this case, and

(2) that the just assessment of the profits to be divided might easily be a matter of great difficulty.

23. The second alternative, and the one that would appear to present the least difficulties, is that a public loan should be raised and the money set aside for the development of the business in question. In this case it would probably be necessary to obtain the co-operation of some experienced business firm, on the lines adopted in connection with the Russelkonda saw mill, by which the firm is paid a commission on profits as renumeration for their business experience and general technical and commercial knowledge. It would be essential in this case that the capital raised should be placed at the disposal of those responsible for the development of the concern without undue restrictions as to annual expenditure.

24. It is clear enough then, however it is looked at, that our Forests are of great value and are in urgent need of exploitation; everything is ready to go ahead except that the funds necessary for development are not forthcoming. We have before us the example of the forest industries, started of recent years in North India, which, although the majority of them are not yet on a true business footing, are, nevertheless, taken as a whole, paying most remarkable profits.

25. Down here in Madras we have far better timbers, a far greater variety of timbers, and a far larger quantity of timber than they have in North India, yet we cannot develop; the reason is, once again, solely lack of funds.

If the money is forthcoming from Government,—if not from private enterprise,—and a bold forward policy is adopted there is little doubt that an immense increase in Forest Revenue will materialise in the course of a few years, and the whole country will benefit correspondingly.

C. C. WILSON.

The Marathon race run on 30—11—21.

The race was run during the joint camp of the two Divsions at Sethumadai. The course was only a distance of 7 miles of which the major part lay on a hard metalled road. Most of the students ran with bare feet, and felt the after effects of their running rather badly. Out of 68 students only 63 faced the starter, and of these one student was disabled on the way, so that only 62 completed the course.

The first place was keenly contested for from the beginning by two Coorg students of the Senior Division, viz, N. S. Poonacha, the winner of the race last year, and M. B. Aiyanna, the winner of many athletic honours during this year. To the very end they were seen running abreast, and almost marking time together. Nearing the winning post, however, Ayyanna made a timely dash forward and came out first by about 4 paces. The third man got his place uncontested, but his follower had to exert all his energy to beat his closely following countryman. Of these four places, three were taken by the Senior Division and one by the Junior Division.

The inter divisional challenge-cup went to the Senior Division.

The prizes were distributed by Mrs. Wilson, who afterwards kindly entertained the students to light refreshments and cool-drinks.

The prize winners in order were:

(1) M. B. Ayyanna (Senior Division) who finished the course of 7 miles in 48 minutes.

(2) N. S Poonacha (Senior Division) — Time: 48 minutes and 1 second.

(3) P. Madhavan Nair Junior Division.

and (4) G. R. Kelkar Senior Division.

P. SITHAPATHI AYYAR.

Capture of Gopalan.

In the Anamalais of South Coimbatore Division, elephant capturing operations are extensively carried out during a certain part of the year commonly known as "elephant capturing season" This season occurs during the rainy months, during which period the herds of wild elephants in this locality usually wander from place to place

When the Madras Forest College, Junior Division was camping at Topslip, two miles from Mount Steart, there was a fall of a calf at the Seechalipallam pits. Early morning of the 20th November 1921, the news of the "pit-fall" was brought to the camp. The students were quite excited at the tidings and immediately hastened to the spot.

Seechalipallam is a valley situated about two miles from Mount Stuart, and is an ideal place for elephant capturing operations The pit, wherein our capture had fallen, adjoined a streamlet and this with the growth of bamboo all round, entices the herds to visit the locality year after year. The number of pits dug, vary according to the locality. Here the pits are arranged in threes, each of the three pits forming the side of a triangle. When a herd of elephants passes over the area, perhaps one elephant falls into one of the pits; panic seizes the rest of the herd and they rush wildly in all directions, some more perchance, falling into the remaining pits.

The earth excavated from the pits, is thrown far away from the vicinity of the pits, which are left open until the eve of the capturing operation (that is at the commencement of the rainy season), when they are closed. During the elephant capturing season, the pits are inspected twice a day once in the morning and once in the evening by a man specially deputed for the purpose. Sometimes other animals such as bisons, sambur and deer fall, but these are released. Tigers and panthers falling are shot dead, and the cercasses are removed and the pits are recovered, as before

When there is a pit-fall, the information is conveyed to the Range Officer immediately, and the Jamadar arranges forthwith for the rescue of the capture and its removal to the kraal.

We, the students, arrived at the pits and a finer sight of its kind could hardly be imagined. A magnificent young male, about 4½ years old, gazed at us, pawed the ground madly, tossed his huge head and snorted in wild fury His whole body was besmeared with earth thrown up with his trunk. He tossed about, sometimes swaying one leg and sometimes another in a restless manner. Suddenly he would grow restive, throw his whole weight on to his haunches and abruptly dash to the top extending his trunk as if to catch hold of some one standing and wreak his vengeance on him Fortunately there was no accident of the kind, owing to the alertness of the lookerson. In a fit of despondency, he would try to hurt himself by endeavouring to drive his trunk against his tusks. When he had tired himself out, he kept perfectly still for a while, when water stored in bamboo pieces, was poured copiously over his body, especially over the massive head. It was a deplorable spectacle to see so magnificent a least of massive proportions come to such a pass.

The normal dimensions of the pits are 12 feet square at the top, 8 feet square at the bottom and 10 feet deep. Sometimes they are 12 feet deep, but 10 feet is adopted to secure the fall of younger elephants, which are preferred as they are more easily trained than the older ones. The latter even after having been trained, often prove treacherous. Last year there was a big capture and the elephant, "Unni," after being trained, killed a mahout The middle aged ones are easily trained and are quite fit to work in about a year after the date of capture. Calves are generally auctioned as they are unfit for work until eight or nine years of age and their maintenance during this period is an unprofitable business. When a solitary tusker falls into a pit, he either effects his escape or the department releases him, as he is exceedingly difficult to train and even when trained is very liable to return to his former wild ways and prove useless; cases have also occured in which solitary tuskers, while beeing taken out of the pit, have caused grevious injury to the decoy elephants This perhaps is another reason why the department liberates tuskers.

The floor of the pit is packed with brushwood and leaves of a sufficient depth, to break the fall of the elephant. The mouth of the pit is covered with mats made of split bamboos and brushwood and presents an appearance exactly similar to the surrounding ground. The unwary elephant, little suspecting pitfalls, walks over the snare and is precipitated into the pit, to its great annoyance.

Rope made of the fibre of Sterculia villosa, is used for tying round the neck of the animal after he has fallen. Twenty head loads of fibre are required for making one such rope. Ropes of the kind are always available at the Range office, in case of emergency The rope is 40 feet long and tapering towards one end; the diameter of the butt end is 5½ inches A cross bamboo piece was tied to a bamboo pole at a height approximately equal to that of the animal. A white handkerchief was held up before the trunk to divert the animal's attention; meanwhile the bamboo with the cross piece, was lowered down into the pit by the side of the animal and the height was noted to be 5 feet. Sometimes the cross piece tied to the bamboo has to be adjusted three or four times before th exact height of the animal is obtained, but so experienced a man was the Jamadar in question, that the exact height was obtained at the first try. Three fourths of the height of the animal measured to its withers, gives the circumference of the neck. (This was found to be 3 feet 9 inches) In this connection it will be interesting to know that the height of any elephant is nearly (that is within a couple of inches) twice the circumference of one of the front legs.

To return to the work of rescue: a small loop was made at the thick end of the rope. From the base of the loop 3 feet 9 inches (the circumference of the animal's neck) was marked on the rope and a short wooden rod of about 1½ feet in length, was inserted at the mark, and at this point a small fibre rope was attached which was subsequently used to make fast the noose described below. The running end of the main rope was then passed through the loop and a noose was thus formed, its circumference being equal to the animal's neck measurement

This contrivance eliminates the possibility of the animal being strangulated by the subsequent strain placed on the noose. The noose was hoisted up before the trunk by means of bamboo hooks and a white flag was waved about the centre of the ring to attract the attention of the elephant, and thus entice him to raise his trunk and enable the Jamadar to noose the beast. The animal attempted to catch the flag and at this opportune moment the noose was thrown over the uplifted trunk and around the animal's neck · After three futile attempts the noose was correctly worked into position, and then hightened by "mulsars" pulling the rope tightly and beating the knot with the butt ends of bamboos. The animal dashing his head to and fro with a view to extricate himself, facilitated considerably the tightening of the noose. The loose rope was lashed round and across the cross piece of wood connecting the main rope, thus finally making fast the noose.

Small billets and leaves were thrown into the pit alternately till "jumbo" was just able to scramble out. The students did yoemen service in throwing billets into the pits. No sooner had the elephant reached the top than he rolled down on the ground thoroughly exhausted. He lay thus for sometime; meanwhile a fibre rope was tied round one of the hind legs. Four "Kumkis" or decoy elephants are generally used for the rescue of a big capture. But in the case in question, only two (namely "Akbar" and "Lalamiah" were employed as the capture was only a young beast. The neck rope was tethered round the body of "Akbar" and the leg rope round "Lalamiah," both being tuskers of reputation Water was poured over the capture who suddenly arose and made a frantic attempt to escape. He grew incenced at his cramped position and attacked Lalamiah but the latter was quite unmindfull of the franks of the stripling. The capture, then placed his trunk against that of a cow elephant ("Phyllis,' employed usually for riding), as if he was pouring out to her the illtreatment he had received at the hands of his fellow creatures. Between the two decoys, the capture, despite all his resistence, was convoyed three miles to the Krall, a secluded spot in Anapady Sometimes a short "pujah" consisting of breaking cocoanuts and burning incense, is done by the "mulsars" before the elephant is conducted to the Kraal. This "pujah" is surmised to tranquilise wrath of "The Goddess of the Wood" for the loss of an elephant, and is also presumed to confer a long life to the capture.

The Principal and the District Forest Officer with their ladies and our instructors graced the occasion with their presence andtook a lively interest in the affairs of the day Many photographs weretaken.

The Kraal is a wooden structure 16 feet by 20 feet by 15 feet and is raised on concrete masonry with cross drains suitably placed. The floor is paved with planks. The corner pillars are of wood, 1½ feet spuare in section and take the cross bars running horizontally and giving the Kraal a cage like appearence The Kraal is thatched to protect the elephants from sun and rain Some of the cross-barl were drawn out to admit of the entrance of the capture and the animal was coerced inside by Lalamiah while Akbar directed him into the door. The neck rope and the leg rope were cut free. The elephant fretted and fumed in his new place of confinement and one could hardly help thinking that on the previous evening he was roaming in all mirth and enjoyment in the west forests of Anamalais utterly regardless of his impending fate.

During the first night of confinement, the mother called at the Kraal to realease her projeny, but after a vain attempt, was scarced away. The visiting by the mother is usual in the case of a sucking calf and rare in the case of an older elephant (as was the capture in question) This unprecedented event prompted the range staff to prepare a snare for the capture of the mother if she again paid her nocturnal visit, but unfortunately she had bid her last good-bye to her son the first night and never visited the Kraal again.

A week later, the capture, while in the act of being trained by a mulsar, broke the cross beam separating the animal from the trainer and was about to charge him Fortunately he climbed the cross-bars of the Kraal and jumped out before the animal was on him.

Last year a new capture called "Gopalan" died of Anthrax, near the place where the beast in question. was captured; so the hunters called "Gopalan" after the deceased animal. From the agile movement and the general build of the new capture, it is hoped that he will be the pride of the timber yard, and prove himself extremly useful in Forest work.

S. DORARAJA,
M. F. C. 1921—23 Division

Miscellanea.

(a) At the Forest Conference held at Dehra Dun in January last, a very interesting and instructive series of logging operations that are in vogue in America was exhibited in the local cinema by Messrs. Mc. Giffert of the Clyde Engineering Works, Duluth, U. S A., and C. S. Martin Consulting Engineer to the Goverment of India. A large number of Forest Officers and others interested in the subject were present. Among the items of special interest were the exhibits of modern methods of timber extraction; felling, loading, transport by wire-rope ways etc , but the most interesting instrument shown was the Clyde Catterpillar tractor which was demonstrated to be not only more economical and easily manipulated in logging operations than other and old fashioned methods of transport, such as horses and oxen — which unfortunately were still in use (though to a limited extent) even in America—but can be used with advantage for the various operations in connection with road making, clearing of paths in jungles etc, "No road is too steep and no snow too deep" for the Clyde catterpillar. As Mr Martin observed, it is neither possible nor profitable at present, to adopt at once all the modern American methods of extraction in Indian Forests, but some select features of the same are worth copying in India at present, to be followed eventually and gradually by such other modern methods as Indian conditions and finance will permit A beginning has already been made in the Dhoni evergreen forests.

G. V.

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(b) **The True Mahoganies.**—ROLEE, R. H., in *Royal Botnic Gardens, Kew Bulletin of Miscellaneous Information*, No. 4, pp 201-207. London, 1919,

Of late years extensive planting of Mahogany trees has taken place in Trinidad and some other British colonies, and numerous specimens and fruits have been received at Kew with the enquiry as to whether they represent the true plant. Mahogany has long been known as the timber of a tree called botanically *Swietenia Mahagoni* Jacq. usually said to be a native of the West Indies and the adjacent coasts of Central America, but the term has also been extended to other red-brown timbers possessing somewhat similar properties, some of them belonging to other genera of Meliaceae and some to quite different families. The term, however, was originally applied to the West Indian tree, the timber of which has been known for upwards of 300 years, and under the name of Spanish mahogany, early became famous for the construction of articles of furniture.

At a somewhat later date British Honduras became famous as source of mahogany, which until 1886 was generally regarded as the timber of *Swietenia Mahagoni* In that year, however, Sir George KING described and figured a new species under the name of *Swietenia macrophyllu*, this having been grown in the Royal Botanic Gardens, Calcutta, from seeds collected in Honduras. Since then it has been generally recognised that Honduras mahogany is specifically different from the West Indian tree There is also a third species, *S. humilis*, Tucc . a native of Western Mexico, which was thought to be in cultivation at Calcutta. Specimens of the Calcutta tree, however including fruits have recently heen received at Kew, and prove to be a form of *S Mahagoni*, Jacq Further species formerly referred to *Swietenia* have now been transferred to other genera.

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(c) Mechanical Timber-Felling.—GERDIL,, H. (Inspecteur des Eaux et Forets,) in the *Bulletin officiel de la Direcion des Recherches scientifiques et Industrielles et des Incentions* reproduced in *Le Bois*, Year 39, Nos 28 and 29. Paris, Dec, 9 and 16, 1920.

Timber-felling by hand is now a very costly and slow process, owing to the high cost of manual labour. This article supplies the latest information regarding the mechanical felling of timber in France, a problem which assumed great importance during the war.

Each successive operation, clearing, cutting both small and large wood, trimming, and logging, requires, according to the author, a special machine,

Trials of felling with red-hot wires have been discontinued in practice, not only becase this method of carboninsation is too slow but there is too great a risk of killing the stumps and so ruining the coppices. The patent process of H. GANTKE, whereby a moving red-hot steel wire is employed was also tried, but the anthor thinks that the best way is to use a cutting tool.

The author briefly dscribes the instruments which were tested and found satisfactory ; these were the alternating saw, endless band-saw, mechanical axe or chisel, the wire or chain friction saw, the multiboring machine

The problem of clearing has been solved by small locomobile saws several types of which are described by the author.

Credit must be given to the Americans who have produced a single machine which will carry out the whole work: with the help of a single workman.

Extracted from International Review of the Science and practice of Agriculture, February 1921.

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(d) **Experiments in Sowing Seeds of** Cassia auriculata **in India.** — BENNETT H. C , in *The Indian Forester*. Vol. XI, VII. No. I, pp, 25-29, Allahabad, Jan. 1921.

An account of the experiments carried out at Golla, Anantapur, to determine the cheapest successful method of raising *Cassi auriculata* ("Tangedu,") a shrub which yields the most valuable tanning bark in India.

Six different methods of sowing, each on an area of not less than 5 acres, were tried namely :

(1) Broadcast sowing on untouched soil.

(2) Sowing in furrows about 2½ ft. apart and 4" to 6" deep.

(3) Broadcast sowing followed by close ploughing in one direction.

(4) Broadcast sowing followed by close ploughing first in one direction and then at right angles

(5) Close ploughing in one direction followed by hoeing with a 3-pronged fork (or "goru,") seeds sown in the furrowsmade by the prongs which are about 6 in and finally the whole gone over by a "guntakah" or iron plate drawn by 4 oxen in the same direction as the original ploughing was done to root out grass, turn up the soil, and cover the seeds.

(6) Dibbling seeds under trees in soil turned up to a depth of about 6 in. by a spike or crow-bar.

Result.–The cheapest successful method was found to be No. 2. which cost 14 annas, per acre, and by it sufficient seedlings were obtained to stock any area with about 4 800 plants per acre. By method 3 at double the cost, about 27 times as many seedlings were obtained as by method 2, and were somewhat more advanced in growth at the end of a year. By method 5, about twice as many seedlings were got than by employing methods 3 and 4 and they were still more advanced in growth than those obtained by those two methods. The cost was 2-7 rupees per acre more than with method 3 and 8 annas 6 pies more than with method 4 Sowings under bushes and late sowings were failures.

The author suggests a further experiment, employing method 2. but making the furrows 10 ft. instead of $2\frac{1}{6}$ ft. apart and thus tending to ensure sufficient regeneration and considerably less expense

It is possible to grow "Tangedu" on land which can be ploughed, but which is too poor to yield profitable field crops.

Extracted from International Review of the Science and practice of Agriculture April 1921,

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Contributions to the Gass Forest Museum.

Serial No	Contribution.	Contributor.
1	(i) Samples of Soapstone, Manganese ore, Red oxide, and Black oxide (ii) Eleven articles made of Soapstone	L. S. Janes Esq I. F. S D. F. O. Bellary.
2	(i) Two hammer handles of *Terminalia tomentosa and Anogeissus latifolia* (ii) One chisel handle of *Dalbergia sissoo*. (iii) One Police man's baton of *Terminalia tomentosa*.	The Bareilly Wood-working Institute.
3	(i) 202 Botanical specimens for the herbarium (88 of which are new to it, and the rest duplicates). (ii) Specimen showing hypertrophy in *Vitis quadrangularis*	C. E C. Fisher Esq. I. F. S. Conservator of Forests.
4	Specimens of branches of *Trema Orientalis* with larvae of *Phassus malabaricus?* badly boring in them.	M. H. Krishnasamy Student M. F. C 1920—22 Division.

Contributions to the General Library of the Madras Forest College

1. Burma Forest Bulletin No. 1. Preparation of Teak seed for Early Germination, by H. R. Blanford Esq., O B E I. F. S

2. Burma Forest Bulletin No. 2. Early Burning in young Regeneration areas by, C. G. E. Dawkins Esq , I. F S.

3. Western Australia Report of the Forests Department for the year ended 30th June 1921.

4 Progress Report of Forest Administration in the Province of Assam for the year 1919—20

5. Report on Forest Administration in the Andamans for the year 1919—20.

6. Progress Report of Forest Administration in Baluchistan 1919—1220.

7. Progress Report of Forest Administration in Coorg for 1919—1920 by E M Crothers Esq ,

8 Schedule of proposed Delegation of powers to the Chief Conservator and Conservators

9 Ceylon Administration Reports for 1920 (Forest Conservancy).

10. Malaria and the mischief done by the Mosquito, (A lecture).

11, Burma Forest Bulletin No 3. Silvicultural series No 3. Published in April 1921. Planting of one year old teak stumps

12. Forest Bulletin No. 42 (1921). Note on Haldu—Adina Cordifolia; by C E. C. Cox I. F. S.

13 Forest Bulletin No. 43. (1921). Note on Odina Wodier Roxle by C. E. C. Cox I F. S.

14. Forest Bulletin No 44. (1921) Note on Semul or Cotton wood by C. E. C Cox I. F. S.

15 Forest Bulletin No. 45. (1921) Note on the Miscellaneous Forests of the Kurnaom Bhabar by E A. Smythies I. F. S.

16. Forest Bulletin No. 46 (1921). Rate of growth of Bengal sal. (shorea robusta) I. quality by S. H. Howard B. A.

17. Administration report of the Forest Department of he Madras Presidency for the year ending 31st March 1921. 1920–1921.

18. The Game birds of India Burma and Ceylon. Vols I & II by E. C. Stuart Baker O. B E.

19. The Silviculture of Indian trees. by R. S. Troup M. A. C. I. E. Vols. I, II, III.

20. The Indian Forest records Vol. VII Part III. Note on Hopea Canarensis Hole by R. S. Hole C. I. E.

21. Administration report of the Forest Department of His Exalted Highness, the Nizam's Dominions (7—10—19 to 5—10—20)

22. Administration report of the Travancore Forest Department for the year 1095 M. E.

23. Working Plan for the Reserved Forests of the Porahat Division Behar and Orissa by F. K, Makins, B. A. Deputy Conservator of Forests.

24. Flora of the Presidency of Madras by J. S. Gamble Part IV.

Students' Club Fund

Statement showing amounts promised and still due by old students, towards the Students' club :—

Mr. C. S Ramanathan ✓	... ...	10	14	0	
,, M R. Doraiswami ✓	... ...	3	0	0	
,, Kerala Varma	... .	10	0	0	×
,, Gulam Dustagir ✓	... ...	9	0	0	
,, S. A. Dawson ✓	... ...	11	0	0	
,, N T Tambi ✓	... ...	4	0	0	
✓ ,, ~~P. Karnakara Menon~~	~~... ...~~	~~9~~	~~0~~	~~0~~	×
✓ ,, ~~Dhananjeya Rao~~ ✓	~~... ...~~	~~13~~	~~0~~	~~0~~	Paid on ~~9-10-22~~ 25-9-22
,, Kesava Pillai ✓	... ...	12	0	0	
,, I. Ramalingam	... ...	8	0	0	
✓ ,, ~~L. A. Krishna Ayyar~~ ✓	~~... ...~~	~~7~~	~~0~~	~~0~~	Paid on 9-10-22 25-5-22
✓ ,, ~~B. Krishna Ayyangar~~	~~... ...~~	~~15~~	~~0~~	~~0~~	× Paid on 25
,, T. K. Parameswaram Pillai ✓	....	15	0	0	
,, P. Krishnan	... ...	10	0	0	×
,, ~~T. E. Varadachari~~ ✓	... ...	15	0	0	10/- paid 5/- due
,, K. G Sundararaja Rao	... ...	10	0	0	×
,, M. Krishna Ayyar	... ...	10	0	0	×
,, S. V. Sigbhatullahi	... ...	10	0	0	×
,, Gulam Rasool	... ...	10	0	0	×
✓ ,, ~~T. R. Naganatham~~ ✓	~~... ...~~	~~10~~	~~0~~	~~0~~	
,, W. Balakrishna Mudaliar	... ...	10	0	0	×
,, Aiyappa Asari ✓	...	15	0	0	
✓ ,, ~~D. Patel~~ ✓	~~.... ...~~	~~18~~	~~0~~	~~0~~	
,, K. Jayaraman ✓	... ...	12	0	0	
,, P. V. Ramanna Rao	... ...	12	0	0	×
,, R. E. Lemos ✓	... ...	50	0	0	

Gazette Notifications.

22—11—1921.

1. Mr B. F. Rigold, Dy. Conservator of Forests, has been granted by the Secretary of state an extension of furlough on medical certificate for seven days.

2. Mr. H.C. Bennett, Deputy Conservator of Forests, now doing duty as Chief Forest Officer Coorg, on reversion, to this Presidency, to act as Conservator of Forests I circle.

3. Mr. D. T. Barry, Acting Conservator of Forests, I circle on relief by Mr. H.C. Bennett to be D F O Lower Godaveri

29—11—21

Mr. F J Marshall, Forest Engineer granted extension of leave by 2 months and permitted to return to duty at the end of it.

6—12—21

M R Ry. A Raju Naicker avl. E. A. C. of Forests is granted extension of privilege leave for ten days.

13—12—21

Mr Roland Mitchell, D. F. O. Lower Godaveri Division is granted privilege leave for 3 months from the date of relief.

20—12—21

Mr A. B. Jackson, Conservator of Forests, is granted extension of furlough on average salary for 4 days from 30-12-20 up to 2—1—1921.

3—1—22

Mr. D. L Sathe, Deputy Conservator of Forests, is granted extension of privilege leave for 18 days

2 Saiyid Abdul Qadir sahib Bahadur will be Confirmed as E. A C of forests with effect from 30th June 1912.

3 Mr. D. L Sathe, Deputy Conservator of Forests, on return from leave, to be D. F. O West Vellore Division.

4. M. R. Ry. V Narayana Ayyar avl. E. A. C of Forests on relief, to be D. F. O. North Cudappah Division.

5. Mr. C. Mahony E. A. C. of Forests, on relief, to be D. F. O, West Cuddapah Division.

10—1—22.

1 Saiyid Abdul Qadir Sahib Bahadur D. F. O. South Vellore, is granted, subject to certificate of eligibility by the Accountant general an extension of privilege leave for 2 months in continuation of the leave for one month already granted to him.

2. M. R. Ry. T. V. Venkateswara Ayyar E. A. C. of Forests will continue to be in charge of the D. F. O's duties during the absence of Saiyid Abdul Qadir Sahib Bahadur on leave.

24—1—22

(1) Mr. A F. Minchin Deputy Cousevvator of Forests is granted an extension of leave up to 4th March 1922.

(2) Captain W. G. Dyson D. F. O. South Coimbatore,

is granted privelege leave for 3 weeks with effect from or after 2nd February 1922 subject to A. G's certificate of eligibility. He may spend his leave in Ceylon.

The D. F. O, North Coimbatare will be in charge of the current duties of the South Coimbatore office, in addition to his own during the period of absence of Captain Dyson on leave.

3. M. R. Ry. Govinda Menon E. A. C, of Forests is granted combined leave with effect from date of relief for 5 months and 5 days and furlough on half average salary for four months.

(4) Mr. J. A. Master D. F. O. South Cuddappah, is granted 3 month's privelege leave from date of relief after 1st April 1922.

31—1—22.

(1) Mr. D. L Sathe is given a further extension of privilege leave by 12 days in Continuation of the leave alreedy granted.

(2) M. R. Ry. A. Hanumantha Rao Avl E. A, C. of Forests, is granted furlough on half average salary for 6 months in continuation of the privilege leave already granted to him.

(3) The following officers appointed to the Indian Forest service by the Secretary of state reported their arrival at Bombay on the dates noted against them:—

(i) Mr. H. R. M. Law 14—11—21

(ii) „ M. F. Bridge 11—12—21

(iii)	,,	J. S. Connolly	do.
(iv)	,,	D. M. Currie	do.
(v)	,,	T. W. K. Wernham	do.
(iv)	,,	H. P. Ward	do.
(vii)	,,	V. G. Darrington	12—12—21

7—2—22

(1) M. R. Ry. Rao Sahib K. R. Venkataramana Iyer avl. Forest Research offier, is granted with effect from date of relief Combined leave for 2 years (privilege leave to the extent due, and furlough on half average salary for the remaining period).

(2) Mr. J. M. Sweet Assistant Conservator of Forests, is to act as Forest Research officer until further orders.

(3) Mr. Roland Mitchell will be Confirmed as E. A. C of forests with effect from 10—7—1918.

(4) Mr. A. R. Brand E. A. C. of Forests Salem, is appointed to act as Junior Instructor in the Madrass Forest College Coimbatore, vice M. R. Ry. M. R. Sundaram Ayyer reported sick.

Notifications relating to range officers :—

First Circle.

22—11—21.

1. Y. Venkataswami Naidu, Ranger VII grrde, Vizagapatam is transferred to Kurnool South, II Circle. He will join Kurnool South at the end of his privilege leave which terminates on 23—12—1921.

27—11—21.

2. (I) M. R. Ry. A. R. Pingale, Supernumerary Ranger, II Circle is posted to Palakonda Range, Vizagapatam District to join as early as possible after 10—12—21.

(2) Mr. W. S. Fernandez, Ranger III grade on relief by No. (1) is transferred to Ganjam District.

2—12—21.

3. D. E. Lewin, Ranger V grade, transferred from III Circle, is posted to Ganjam District to join on 24—12—1921.

T M. Varadachari, subprotem Ranger IV grade, Gaujam, is transferred to III Circle to join on expiry of his privilege leave.

27—12—21.

4. M. R. Ry. A. V. Sundrram Ayyar, Probationary Extra Assistant Conservator of Forests, Godaveri Lower is posted to the charge of Gokavaram Range.

24—12—21

5 M. R. Ry. I. Ramamurti, Probationary Ranger is appointed as temporary Ranger VII grade from date of taking over charge of the duties of Junior Instructor of the Vernacular Training School,

3—2—22.

6. M. R. Ry. T, Balaramaswami Nayudu, Ranger VII grade, on reversion from Nodgole Estate service, is posted to charge of Nugur Range, Upper Godaveri Division, to relieve M. R. Ry. A. Subramaya Ayyarproceeding on leave.

2—3—22.

7. M. R. Ry. P. Durasswami Ayyar Ranger 4th Grade Godaveri Lower is granted privilege leave for 3 months with effect from date of relief.
(2) The posting of Ranger N. K Sarma to the charge of Polavaram Range vice Duraiswami Ayyar is approved.

2—3—22

8. The posting of Ranger G. Apparow to the charge of Rajahmundry Range, Godavari Lower, vice Mr. Williams transferred to the Vizagapatam District as District Forest Officer, is approved.

7—3—22.

9. M. R. Ry. P. Ramunni Monon Ranger 2nd grade Ganjam District is granted privilege leave for three months with effect from 15 April 1922 or date of relief. He should have completed the building works and submitted completion reports for them before he goes on leave.

11—3—22

10 This Office Service Order No. 7 of 22 dated 2—5—22 granting privilege leave to Ranger S. Duraiswami Ayyar for three weeks and posting Ranger N. K. Sarma to the Polavaram Range, Godavai Lower Division is cancelled.

11—3—22.

11. M. R. Ry, P V. Subbaramayya Ranger 4th grado is granted privilege leave for four months and furlough on half pay for 17 months in

continuation thereof with effect from 1st June 1922, preparatory to retirement.

20—3—22.

12. The promotion of M. R. Ry, I. Ramamurty, Probationary Ranger to Temporary Ranger VII grade ordered in this office S. O. No 77 of 21 dated 14—12—21 is cancelled with effect from 1st March 1922 without prejudice to his appointment as Junion Instructor, Vernacular Training School until the close of the current session.

16—11—21.

Second Circle.

13. Ranger C. G. Ganapathy is granted an extention of furlough for 4 months and twenty days from 21—11—21 in continuation of the 6 months leave granted.

(2) Ranger Abdul Kalak Sheriff on Special duty in Kurnool South is transferred to Bukkapatnam Range, Anantapur District, to relieve Ranger T. K. Ramaswamiayer, forthwith.

12—11—21.

14. In virtue of the consent given by the Chief Conservator for the mutual transfer of M. R. Ry, Y. Venkataswamy Naidu Ranger, 7th Grade, of I Circle, and M. R Ry, A. R. Pingale, Supernumerary Ranger, II Circle, the following transfers of Rangers are ordered.

1. M. R. Ry, N. R. pingale, special duty ranger, posted to the charge of Chelama Range for one month from 10—11—21 during the absence of Ranger B. Punniah, Granted Previlege leave for one month from 10—11—21, is transferred to the Ist Circle after the expiry of his Range Charge.

2. M. R. Ry, Y. Venkatasvamy Naidu, Ranger 7th Grade, of I, Circle, is posted to Kurnool South to work under the orders of the District Forest Officer, Kurnool South.

24—11—21.

15. The following transfers of Rangers are ordered:—

(1) Supernumarary Ranger P. V. Krisha Rao Naidu from Cumbum Range to Rachakonda Range Kurnool East Division.

(2) Probationary Ranger C. S. Ganapathy from Special duty to the charge of Cumbum Range.

(3) Ranger R. Gulam Dastagir from Rachakonda Range to special duty in Kurnool East Division.

26—11—21.

16 (1) M. R. Ry, Y. Venkataswamy Naidu, Ranger VIIth grade of Ist Circle transfered to this circle and posted to Kurnool South Division to work under the orders of the District Forest Officer is posted to Sivappram Range of Kurnool West Division. The order posting him to Kurnool South is therefore cancelled by this order.

(2) M. R. Ry, T. Sreeramulu Naidu, Ranger, Sivapuram Range on relief by No. I, is transferred to Kurnool South Division to work under the orders of the District Forest Officer Kurnool South. His transfer to Kurnool South is in place of A. R. Pingale transferred to Ist Circle.

5—12—21.

17. In continuation of one month Privilege leave granted by the District Forest Officer to Ranger, B. Puniah from 10—11—21 an extension of Privilege Leave for 11 days from 11—12—21 and permission to avail the ensuing Xmas & New year holidays in continution is granted subject to his eligibility for the leave which should have been reported by the District Forest Officer.

6—12—21.

18. (1) M. R. Ry, A. Vyasulu, Ranger, VII Grade is transferred from Kudligi Range Bellary District to Kurnool East Division to take charge of Morricherruvu Kange.

(2) M. R. Ry, M. Krishna Rao Ranger, IV Grade on relief by No (1) is transferred to Bellary District to take charge of Kudligi Range.

8—12—21.

19. The following postings are ordered to take effect from 10th January 22.

(1) Mr. Sreenivasaraghavan, Pro. Extra Asst. Conservator of Forestst, attached to Kurnool West to be in charge of Dhone Range unti further orders.

(2) M. R. Ry, M. Umapathi Mudaliar, Range Officer, Dhone Range Kurnool West Division, to be on Special Duty under the orders of the District Forest Officer, Kurnool West, until further orders.

12—12—21.

20. In modification of this Office S. O. No. 90/21, dated 6—12—21, the following transfers of Rangers are ordered :—

1. Mr. I. John, Ranger 7th Grade, attached to Bellary Range is transferred to Kurnool East District, to charge of Morricheruvu Range. This cancels the posting of A. Vyasulu to Morricheruvu Ranger Kurnool East Division.

2. M. R. Ry, M. Krishna Rao, Ranger 4rth grade, attached to Morricheruvu Range, Kurnool East, on relief by No. I. is transferred to Bellary Range.

22—12—21,

21. M. R. Ry, C. Ramaswamy Naidu, Ranger, II Grade Guntur District is granted an extension of leave for 1 month (I day privelege leave and 29 days forlough on half salary) in continuation of the leave granted him in this Office S. O. No. 61/21 dated 27—9—21.

(2) The existing arrangements will continue.

3—1—22.

22. M. R. Ry, T. Sreeramulu Naidu, Supernumerary Ranger posted to Karnool South Division to work under the orders of the District Forest, Officer is granted privilege leave for 3 months subject to his elegibility therefor.

23—1—22.

23. M. R. Ry, C. Ramaswami Naidu, Ranger, IInd Grade Guntur District is granted an extension of leave for one month (furlough on full average salary) in continuation of the leave granted to him in this Office Service Order No. 4 of 22 dated 14—1—22.

2. The existing arrangements will continue.

1—2—22.

24. Ranger H. Ramarow is considered to be on special duty in Karnool south from date of relief of Range charge (Sirval Range) till his final relief from special duty i. e. from the forenoon of 30—12—21 to the forenoon of 26—1—22 .

26—2—22

25 M. R. Ry N. E. Kanakiah, Ranger IV grade Kurnool West Division is granted 4 months privilege leave from the date of relief; he should be ordered to appear before the District Medical Sanitary Officer, for medical examination.

12—2—22

26 (1) Ranger Mr. Syed Ibrahim Albiz Sahib IV grade transferred from V Circle (Kollegal District) is posted to work under the orders of District Forest Officer Kurnool West Division.

(2) Ranger M R. Ry. A. M. Sreenivasalu Naidu VI grade transferred from V Circle (Tinnevelly District) is posted to work under the orders of District Forest Officer Kurnool South Division.

6—3—22

27 (1) Abdul Khalak Sheriff, Acting Ranger in charge of Bukkapatnam Range is reverted to his permanent post as Forestor I grade persuance of Chief Conservator's Proceedings 340/27—2—22. To take effect atonce.

(2) M. R. Ry. H. Rama Row Ranger II grade is posted to Bukkapatam Range; Anantapur District on return from leave which expires on 25—3—22

15—2—22

28 Ranger Syed Ibrahim Albiz Sahib is posted to Gundlabrahmeswaram Range to take charge immidiately.

Third Circle.

17—11—21

29. M. R. Ry. C. R. Rajagopalan Ranger VI grade is granted furlough on full pay from 11th to 13th October 1921 in continuation of the leave already argnted to him in this office Service Order No. 115/21 dated 10th October 1921.

19—11—21

30. In modification of this offiice Service Order No. 2/21 dated 4th

January 1921, M. R. Ry. C. Balaya Nayudu, Ranger V grade is granted combined leave for 2 years with effect from 5th April 1921 as follows:—

	Years	Months	Days
Privilege leave	0	1	18
Furlough on full pay	0	6	12
do on half pay	1	4	0
	2	0	0

24—11—21

31. Mr. D. E. Lewin Ranger V grade in charge of Kondapuram Range West Cudappah District is transferred to I Circle vice Ranger T. E Varadachari. This cancels the privilege leave granted to Mr. D. E. Lewin in this office Service Order No. 122/21 dated 5th November 1921 and he should join the I Circle on 24th December 1921.

(2) M. R. Ry. B. V. Vaideeswara Ayyar Ranger V grade on relief of Sathiavedu Range charge in Chingleput District is posted to do special duty under the orders of the District Forest Officer West Cuddapah eventually to relieve Ranger D. E. Lewin on 15th December 1921. This cancels his immediate posting to Kondapuram Range ordered in Service Order No. 128/21 dated 11th November 1921.

1—12—21

32. M. R. Ry. C. R. Rajagopalan Ranger VI grade is granted furlough on full pay from 14th to 22nd October 1921 (both days inclusive) in continuation of the leave already granted to him in this office Service Order No. 131/21 dated 17th November 1921.

3-12-21

M. R. Ry. V. P. Narayana Menon Ranger IV grade on return from the privilege leave granted to him in this office Service Order No. 64 of 1921 dated 8th June 1921 is posted for special duty under the orders of the District Forest Officer, Chittoor.

11-12-21

34 M. R. Ry. T. E. Varadachari Ranger IV grade (Sub protem) transferred to the III Circle Conservator's Service Order No. 75 of 21 dated 2nd December 1921, is, on the expiry of his leave on *24th December 1921* posted for special duty under the orders of the District Forest Officer North Cuddapah District, Cuddapah.

16-12-21

35 M. R. Ry D. Krishnaswamiah Probationary Ranger posted to West Cuddapah District in this office Service Order No. 105/21 dated 21st September 1921 for a period of 2 months is permanently transferred for special duty under the orders of the District Forest Officer West Cuddapah District.

21-12-21

36 M. R. Ry. D. Krishnaswamiah Probationary Ranger on special duty West Cuddapah District is posted to the charge of Sanipaya Range of the same District.

Mr. J. M. Abraham, Ranger IV grade on relief by No. 1 is posted for special duty under the orders of the District Officer, West Cuddapah.

22-12-21

37 M. R. Ry. T. E. Varadachari, Ranger IV grade Sub-protem is granted an extension of leave for 3 months with effect from 23rd Decembe 1921.

2—12—21

38 Ranger M. R. Ry. A. Ranganayakulu Nayudu on return from leave is reposted to the charge of Rajampet Range, South Cuddappah Division On relief by Ranger A. Ranganayakulu Nayudu Ranger T. T. Ansep to be on special duty in the South Cuddapah Division.

Ranger T. T. Ansep is appointed to be the Senior Instructor of the Vernacular Training School in the North Cuddappah Division to report himself for that duty at Cuddappah on 20th January 1922.

Forester M. Krishna Ayyar is appointed to be Junior Instructor at the Vernacular Training School to report himself for duty at Cuddappah on 20th January 1922.

26—12—21

39 Mr. B. K. Roy I. F. S. is posted to the charge of the Madanapalli Range and will take over on the 16th January.

31—12—21

40 M. R. Ry. V. P. Narayana Menon, Ranger IV Grade North Cuddappah District is granted on extension of privilege leave by 1 month in continuation of the 4 months' privilege leave granted to him in this office Service Order No. 64/21 dated 8th June 1921.

2—1—22

41 On relief by Mr. B. K. Roy, Ranger K. R. Viswanatha ayyar to be on special duty under orders of the District Forest Officer, Chittur with head quarters at Madanapalli.

6—1—22.

42. M. R. Ry. T. S. Narayanaswami Chetty, Ranger. VII grade is granted a further extension of leave without allowances for 1 month with effect from 21st December 1921 in continuation of the leave

granted to him in this office Service Order No. 126/21 dated 10th November 1921.

21—1—22.

43. M Krishna Iyer, Forester Ist grade appointed to be Junior Instructor, Vernacular Training School 1922 session is promoted to act as Ranger VII grade (Temporary) with effect from the date of taking up the duties.

21—1—22.

44. Mr. J. M. Abraham, Ranger, IV grade is granted Privilege leave for 4 months with effect from 10th December 1921.

31—1—22.

45. The three months extension of leave granted to M R. Ry, T. E. Varadachari, Ranger, IV grade in this Office Service Order No I43 of 1921 dated 22nd December 1921 will be treated as leave on full average salary.

2—2—22.

46. In continuation of the one month's suspension ordered in this office Service Oader No. 125/21 dated 9th November 1921 Mr. E. W. Fernandez, Ranger, V grade is granted furlough on full pay for 3 months with effect from 1st December 1921.

2—22—22.

47. The following posting and transfer of Rangers are ordered :—

1. M. R. Ry, T. E. Varadachari, Ranger IV grade North Cuddapah District on expiry of his leave on 23rd March 1922 is posted to the charge of Balapalle Range, South Cuddapah District.

This cancels this office service order No. 139/21 dated 11th December 1921.

2. M. R. Ry, L. R. Narayana Aiyer, Ranger, II grade Sub-protem in charge of Balapalle Range, South Chuddapah District on relief by No. 1 is permanently transferred to the VI Circle.

3. Mr. J M. Abraham, Ranger, IV grade West Cuddapah District on expiry of the 4 months Paivilege Leave granted to him with effect from 10th December 1921 is permanently transferred to the IV Circle.

5—2—22.

48. Ranger S. Sankara Alwa is reduced to the 7th grade until further orders from 1st February 1922 and on relief of the Ganganapalli Range will be transfered to South Cuddapahand placed on special duty under the orders of the District Forest Officer.

5—2—22.

49 Probationary Ranger A. Sitharamiah, on special duly Nellore District is transferred to West Cuddappah for charge of the Ganganapalli Range in relief of S. Sankara Alwa.

10—2—22.

50. M. R. Ry, T. S. Narayanaswami Chetty, Ranger VII grade is granted a further extension of leave without allowances for 2 months with effect from 21st January 1922 tn continuation of the leave granted to him in this office Service Order No. 2/22 dated 6th January 1922.

20—2—22.

51. 1, Ranger K. R. Viswanatha Ayyar IV grade on special duty Chittoor District is transferred to the North Vellore District on special duty under the orders of the District Forest Officer.

2. K. Raghuraman Probationary Ranger on special duty North-Vellore is posted as Junior Instructor Vernacular Training School North Cuddapah District to join at once.

3. On relief as Junior Instructor Vernacular Training School Forester M. Krishna Ayyar is posted to the Nellore District to act as Drafts-man.

6—3—22.

52. M. R. Ry V. P. Narayana Menon, Ranger IV grade on special duty under the orders of the District Forest Officer, Chittoor is posted to the charge of Mamandur Range of the same District in relief of Probationary Extra Assistant Conservactor Mr. Mohamed Amir Padsha Sahib transferred to South Cuddapah District.

Fourth Circle.

8—9—21.

53. Ranger M. R. Ry., V D. Ramalingam, is granted paivilege laeve for 9 days from 17—7—1921 to 25—7—1921 both days inclusive a recommended by the District Medical and Sanitary officer.

10—12—21.

54. The privilege leave granted to M. R. Ry. D. Srinivasachari, Ranger IV Grade, in this office Service Order No. 137 of 1921, dated 30—8—1921, till 14—10—1921 inclusive, is extended by one day.

2—1—22.

55. M. R. Ry., S. G. Venkataramanan, Ranger, VI grade. in charge of Vaiyampatti Range, South Salem Division, is sppointed as Instructor, Vernacular Training School, to be held in the North Salem Division, during the Session 1922.

He should report in Salem.

(2) M. R. Ry., T. Kesavalu Nayudu, Forester I grade, Central Salem Division, is appointed as Assistant Instructor, Vernacular Training School, to be held in North Salem Division, during the Session 1922.

(3) M. R. Ry., C. D, Parthasarathi Chetti, Ranger, IV grade, on

special duty, East Salem Division, is posted to the charge of Vaiyampatti Range, South Salem Division.

2—1—22

56. M. R. Ry., S. Ramanujam Sesha, Ranger VI grade, on special duty, Central Salem Division, is granted leave for one year (privilege leave for 10 days and the rest furlough on half salary) from 3—1—1922 or date of relief.

3—1—22.

57. M. R. Ry. S. Nageswara Ayyar, Supernumerary Ranger, on spike duty, North Salem Division, is granted privilege leave from 14th to 28th December 1921 inclusive

10—1—22.

58 This office Service Order No. 179—21, dated 4—12—1921 granting privilege leave to Saiyid Yahia Sahib, Ranger VI grade, Chitteri Range, East Salem Division, is cancelled.

10—1—22.

59. The following transfers of Rangers in East Salem Division, are ordered :—

Name	Grade.	From	To
R. Manikkam Pillai.	III	Kallakurichi Range.	Chitteri Range
Syed Yahia Sahib.	VI	Chitteri Range.	Kallakurchi Range.

10—1—22

60. Para 3 of this office Service Order No. 1 of 1922, dated 2—1—1222 posting Ranger C. B. Parthasarathi Chetti to the charge of Vaiyampatti Range, South Salem Division, is cancelled.

(2) M. R. Ry. T. V. Govinda Rao, Ranger V grade, on special duty, East Salem Division, is posted to the charge of Vaiyampatti Range, South Salem Division.

15—1—22.

61. M. R. Ry., K. L. Munisami Ayyar, Ranger I grade, *Sub-protem* in charge of Salem Range, Central Salem Division, is granted 6 months leave from date of relief.

(2) M. R. Ry., T. P. Palanikumaran Pillai, Supernumerary Ranger on special duty, West Vellore Division, is transferred to Central Salem Division to the chargo of Salem Range and will relive No. 1 at once.

25—1—22.

62. R. Ry:, P. A. Krishnaswami Mudaliar, Ranger V. grade, North Salem Division, is granted furlough on average salary from 18—12—1921 to 30—1—1922, both days inclusive.

22—1—22.

63. This office Service Order No. 9 of 1922, dated 10—1—1922 ordering transfer of Rangers Saiyid Yahia and Manikkam Pillai, is cancelled.

(2) Saiyid Yahia Sahib, Ranger VI grade, in charge of Chitteri Range, East Salem Division, is transferred to Central Salem Division for charge of Salem Range, on relief by No. 4.

(3) M. R. Ry., T. P. Palanikumaran Pillai, Supernumerary Ranger in charge of Salem Range, will on relief by No. 2 return to West Vellore Division, for special duty.

(4) M. R. Ry., P. A, Krishnaswami Mudaliar, Ranger V grade, on return form leave on 31—1—1922, is posted to the charge of Chitteri Range, East Salem Division.

(5) M. R. Ry., R. Manikkam, Ranger III grade, on relief by No. 7 to North Salem for charge of Dharmapuri Range.

(6) M. R. Ry., Saiyid Munavar, Ranger V grade to proceed to Krishnagiri Raage, West Vellore Division, to relieve No. 7.

(7) M. R. Ry., K. P. Krishna Ayyar, on relief by No. 6, is transferred to East Salem for charge of the Kallakurichi Range.

7—2—22.

64. M. R. Ry., S. M. Srinivasagam Pillai, Ranger V grade *subprotem*, North Salem Divison, is reduced to VI grade for a period of six months, with effect from 7th February 1922.

7—2—22.

65. S. Ramalingam Ayyar, Supernumerary Ranger was in charge of Denkanikota Range from 1—2—1922 to 7—1—1922 both days inclusive.

5—2—22.

66. M. R. Ry., C. D. Parthasarathi Chetti, Ranger IV Grade, on apecial duty, East Salem Division, is granted privilege leave on urgent private affairs for one month from date of relief.

1I—2—22.

67. M. R. Ry., T. P. Palanikumaran Pillai, Supernumerary Ranger, on relief of Salem Range, is posted to the charge of Shevaroys West Range, Vice Mr. A. R. Brand, Extra Assistant Conservator of Forests, appointed as Junior Instructor in the Madras Forest College or until further orders.

(2) This cancels para 3 of this office Service Order 24 of 1922 dated 29—1—1222 transferring No. 1 to West Vellore.

18—2—22.

68. Kesavalu Nayudu, Forester I grade, Central Salem Division, and Junior instructor, Vernacular Training School, North Salem Division, is reverted to his pormanent appointment of Forester from date of relief.

(2) S. Ramalingam Ayyar, Supernumerary Ranger, North Salem Division is appointed as Junior Instructor, Vernacular Training School and relieve No. 1 forthwith.

20—2—22.

69. M. R. Ry., V. D. Ramalingam, Ranger VI grade, on return from suspension, is posted to the charge of the Namakkal Range. South Salem Division.

(2) M. R. Ry., S. Nagalingam Pillai, Ranger VI grade, *subprotem*, on relief by No. 1, is posted for special duty in the South Salem Division.

Fifth Circle.

16—11—21.

70. M. R. Ry, K. S. Ramiah, Ranger, IV Grade, is granted privilege leave for 7 weeks, from 3rd September 1921, in continuation of the extension granted In this office S O. No. 88 of 1921 dated 14th August 1221.

17—11—21.

71. The leave for 15 days from 18th August 1921 granted to M. R. Ry, M. Gulab Singh, Ranger, VI grade, Kollegal in this office No. 2221, dated 2nd September 1921, is treated as furlough on full average salary.

20—11—21.

72. Ranger M. R. Ry, N. S. Eswara Ayyar, VI grade, is transferred from North Coimbatore to do duty under Mr. Lemos (Temporary Extra Assistant Conservator) in the Tinnevally District.

1—12—21.

73. On relief by Ranger Mr. Syed Ibrahim Albiz. Ranger, M. R. Ry, Gulab Singh is transferred to North Coimbatore, to work as the District Forest Officer directs.

9—12—21.

74. Ranger, M. R. Ry, Jaganatham Pillai, is transferred (from South Coimbatore) to North Coimbatore district on the expiry of his leave.

9--12—21.

75. Ranger, M. R. Ry, S. M. Krishnasawmy Ayyar is reduced one grade, from 1st December 1921, for six months.

13—12—21.

76. Mr. Syed Ibrahim Albiz Saheb, Forest Ranger is granted privilege leave for a month and a day from the 6th November last.

20—12—21.

77. M. R. Ry, S. Chinnadurai Pillai, Ranger, II grade is granted combined leave for 3 months and 15 days from 16 October 1921 (Privilege leave for 1 month and 1 day and furlough on full average salary for remaining period.)

22—12—21.

78. In supersession of North Coimbatore District Forest Officer's S. O Nos. 223 of 21, dated 11th July 1921, this Office S. O. Nos. 88 of 21, dated 14th August 1921, and 114 of 21, dated 16th Novemberr 1921, M. R. Ry, K. S. Ramiah Ranger, IV grade is granted combined leave for four months and 2 days (from 5th July to 6th November 1921 inclusive) privilige leave for 3 months and 19 days and furlough on half average salary for the remaining period.

23—12—21.

79. Mr. S. Chinnadurai Pillay, B. A., Ranger, II grade, is on the expiry of his leave (3 month and 15 days leave from 16—10—1921) transferred from Tinnevelly to North Coimbatore Division to be put in charge of one of the Ranges by the District Forest Officer.

23—12—21.

80. The following promotions are ordered in the 'Foresters' class with effect foom 1st September 1921 :—

Name.	Permanent Grade.	Grade to which promoted	Remarks.
K. O. Anandam,	III	II (permanent.	—

25—12—21.

81. Mr. M. P. Philips, Probationary Ranger, Tinnevelly Division, is granted privelege leave for 2 months, with effect from 24th October last, with permission to affix the Christmas holidays.

4—1—22.

82. M. R. Ry, Chidambara Ayyar, Ranger, IV grade, Mettupalayam Range is transferred, on relief by Ranger, Mr. S. Chinnadurai, from North Coimbatore District to Madura District to charge of Kodaikanal Range.

2. M. R. Ry, K. Kunhiraman Menon, Ranger, VII grade, on relief by No. 1, is transferred to Tinnevelly District, to work under the District Forest Officer.

12—1—22.

83. Reference:– Tinnevelly District Forest Officer's R. O. C. No 1857-21 dated 2nd January 1922, requesting to grant combired leave for

1 month and 17 days, from 18—11—1921 i. e. privilege leave for 6 days and commuted furlough on full salary for the remaining period to M. R. Ry, S. M. Krishnaswamy, Ayyar, Ranger. Approved.

27—1—22.

84. In continuation of the leave granted in this Office S. O. No. 125 of 1921, dated 20th December 1921, M. R. Ry, S. Chinnadurai Pillai, Ranger, II grade, is granted furlough on full average salary for 3 months,

30—1—22

85. Ranger M. R. Ry, M. Sankaran Nair of Kollegal District is transferred to Tinnevelly District to work under Mr. Lemos until further orders. He should proceed to Ambasamudram and report himself to Mr. Lemos.

31—1—22.

86. Owing to the Chief Conservator's order to transfer 6 posts of Rangers in excess of the cadre in this Circle, the following transfers are ordered:

(1) M. R. Ry, S. Chinnadurai Pillai, Ranger II grade, is transferred on the expiry of his leave, to the 2nd Circle.

(2) Ranger, M. Syed Ibrahim Albiz Sahib, IV grade, Kollegal, is transferred, on the expiry of his leave, to the II Circle.

(3) Ranger, M. R. Ry, A. M. Srinivasulu Naidu, VI grade is transferred to the II Circle.

(4) Ranger M. R. Ry, N. S. Eswaram, VI grade, on the expiry of his leave, is transferred to the I Circle.

(5) Ranger, Mr. J. D. Theodore, VI S P. T. (Tinnevelly District,) is transferred to the I Circle. (on the expiry of his leave.)

(6) Ranger M. R. Ry, S. M Krishnaswamy Ayyar, IV grade (Tinnevelly District) (reduced to V for 6 months from 1—12—1921) is transferred to the I Circle.

31—1—22.

87. Syed Ibrahim Albiz Saheb, Ranger, IV grade, Kollegal, is granted furlough on average salary for 2 months in continuation of the Privilege leave granted to him in this Office S. O. No. 124 of 1921.

5—3—22.

88. The following promotions and confirmations are ordered in the Foresters class with effect from 1st January 1922:—

	Name.	Present Grade.	Grade to Which Promoted	Remarks.
1.	P Sankunni Nayar (North Mangalore, VI Circle)	III	II grade permanent.	Without prejudice to his appointment as a supernumerary Ranger.
2.	P. A. Venkataraman (Forest College.)	Do	Do	

Sixth Circle.

24—11—21

89 M. R. Ry. C. Vasu, Ranger VI grade is posted to Palghat Division for special duty under Ranger Sankunni Menon.

4—12—21

90 M. R. Ry. A. G. Jesudasan Pillai Ranger VI grade is granted furlough on average salary for 3 months from 3rd October 1921 in continuation of the privilege leave for one month granted to him by the District Forest Officer, South Mangalore.

8—12—21

91 The following postings of Rangers are ordered:—

(1) Supernumerary Ranger, P. Saukunni Nair to the charge of Mangalore Range.

(2) M. R. Ry. M. P. Subbiah, Ranger VI grade on special duty, Dhoni, to the charge of Puthur Range.

The posting of Ranger, A. J. Jesudasan Pillai to Mangalore Range ordered in this office S. O. No. 61 dated 12th November 1921 is cancelled.

14—12—21

92 (1) Under article 260 of the C S. R. M. R. Ry. B. Sambamoorthy Iyer, Ranger V grade in charge of Sigur Range is granted privilege leave for two months from date of relief.

(2) M. R. Ry. S. V. Doraiswami aiyer, supernumerary Ranger is posted to the charge of Sigur Range:

To join immedediately on relief of, by Ranger Appiah.

24—12—21

93 A. G. Jesudasan Pillai, Ranger V grade on leave, is posted to the charge of Sigur Range, in relief of Ranger, B. Sambamoorthy Ayyar to join on or before 1st January 1922.

This cancels the posting of supernumerary Ranger. S. V. Doraiswami aiyer to the charge of Sigur Range ordered in this office S. O. No. 68 dated 14--12—21.

28—12--21

94 M. R. Ry. C. S. Jesudasan Pillai Ranger VII grade is granted privilege leave for 4 months from 15th January 1922 and furlough on half pay from 15th May 1922 to 7th October 1922 inclusive, preparatory to retirement.

28—12—21

95 Mr. J. S. Rowland, Ranger IV grade, is granted privilege leave for two months from date of relief.

24—12—21

96 The following transfers and postings are ordered:—

(1) M. R. Ry. C. Karunakara Menon, Ranger V grade is transferred from Palghat to Wynad and posted to the charge of Chedleth range. To join on the 15th January 1922.

(2) Supernumerary Ranger, K. Raghavan is transferred from Nilambur to Wynad to the charge of Kanoth Range, to join atonce.

(3) Supernumerary Ranger, S. V. Doraiswamy ayyar is transferred from the Nilgiris to Wynad for special duty in Chedleth Range, to join atonce.

22—1—22

97 The following promotions of Foresters are ordered with effect from 1st October 1921:—

1. K. Raghavan, from II grade to I grade permanent.
2. S. V. Doraiswami Ayyar, from III grade to I grade permanent.

3. P. Kannan, from III grade to I grade permanent.
without prejudice to their appointments as Supernumerary Rangers.

9—2—22

98 Mr. J. S. Rowland, Ranger IV grade, who was granted privilege leave for 2 months from 11—1—1922 in this office S. O. No. 71/21 dated 28—12—21 is transferred from the Wynaad to the Nilambur division and permited to join duty.

(2.) The unexpired portion of his leave (from 31—1—1922 to 12—3—1922) is cancelled.

12—2—22

99 M. R. Ry. B. Sambamurthi Ayyar, Ranger V grade on return from leave is posted to the charge of Palghat range.

15—2—22

100 Mr. S. F. Lobo, Ranger VII grade, working under the Forest Research Officer, Coimbatore, is granted privilege leave for 4 months from date of relief by Ranger, K. C. Joseph.

17—2—22

101 M. R. Ry. C. Vasu, Ranger VI grade on special duty in Palghat division is granted privilege leave for 3 months from date of relief.

M. R. Ry. K. G. Monappa, Ranger VI grade is granted privilege leave for 2½ months from date of relief.

M. R. Ry. N. Gopalan Nair, Ranger VII grade in charge of Olavakkode depot (Palghat division) is transferred to Mudumalai Range as Assistant Range Officer. To join on relief.

102 The following promotions are made in the Ranger class with effect from 1st December 1921 in the vacancies due to the confirnation of Mr. C. Mohony, Ranger II grade, as Extra Assistent Conservator and to the retirment of M. R. Ry. D. Srinivasachariar, Ranger IV grade.

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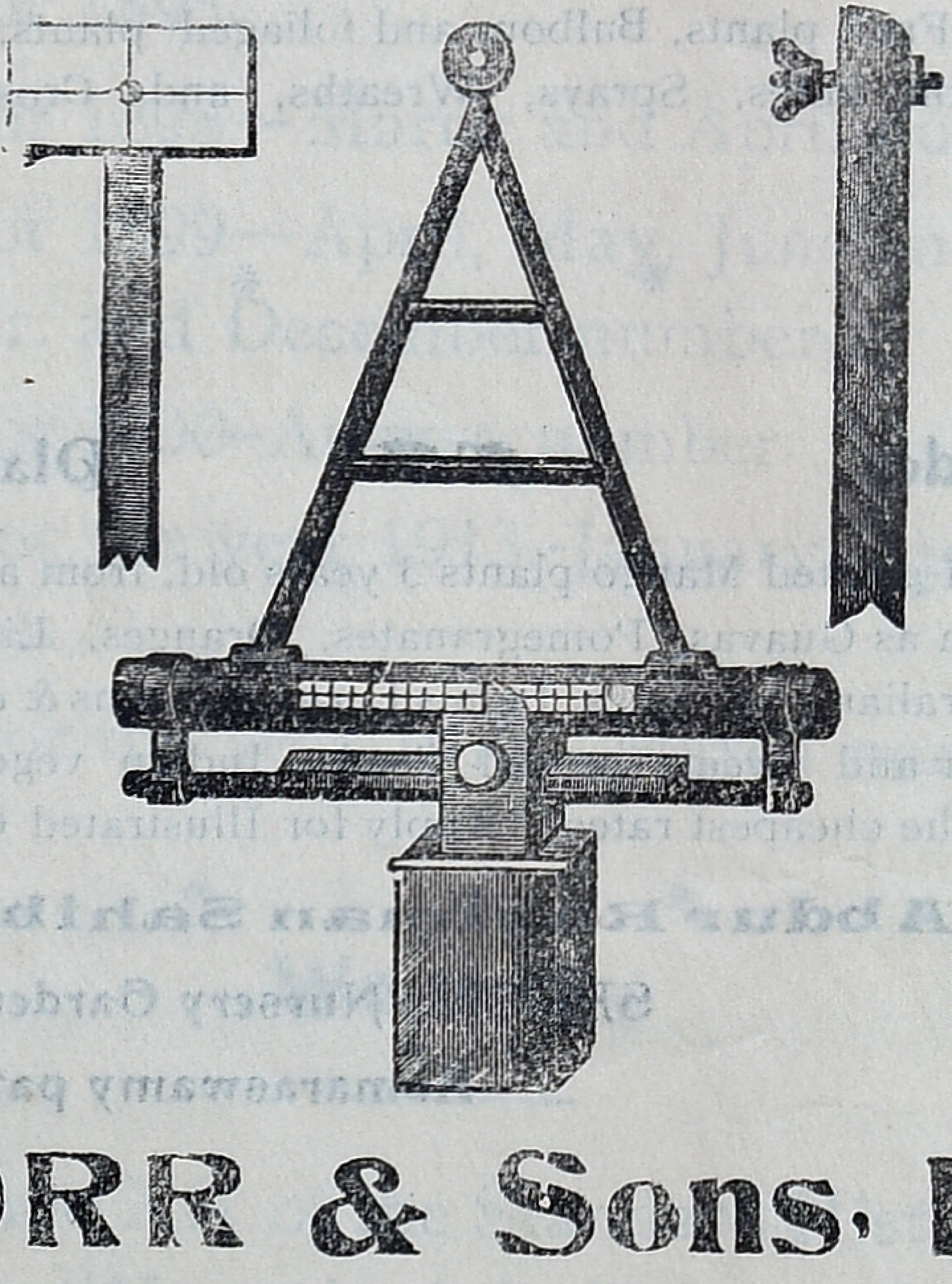

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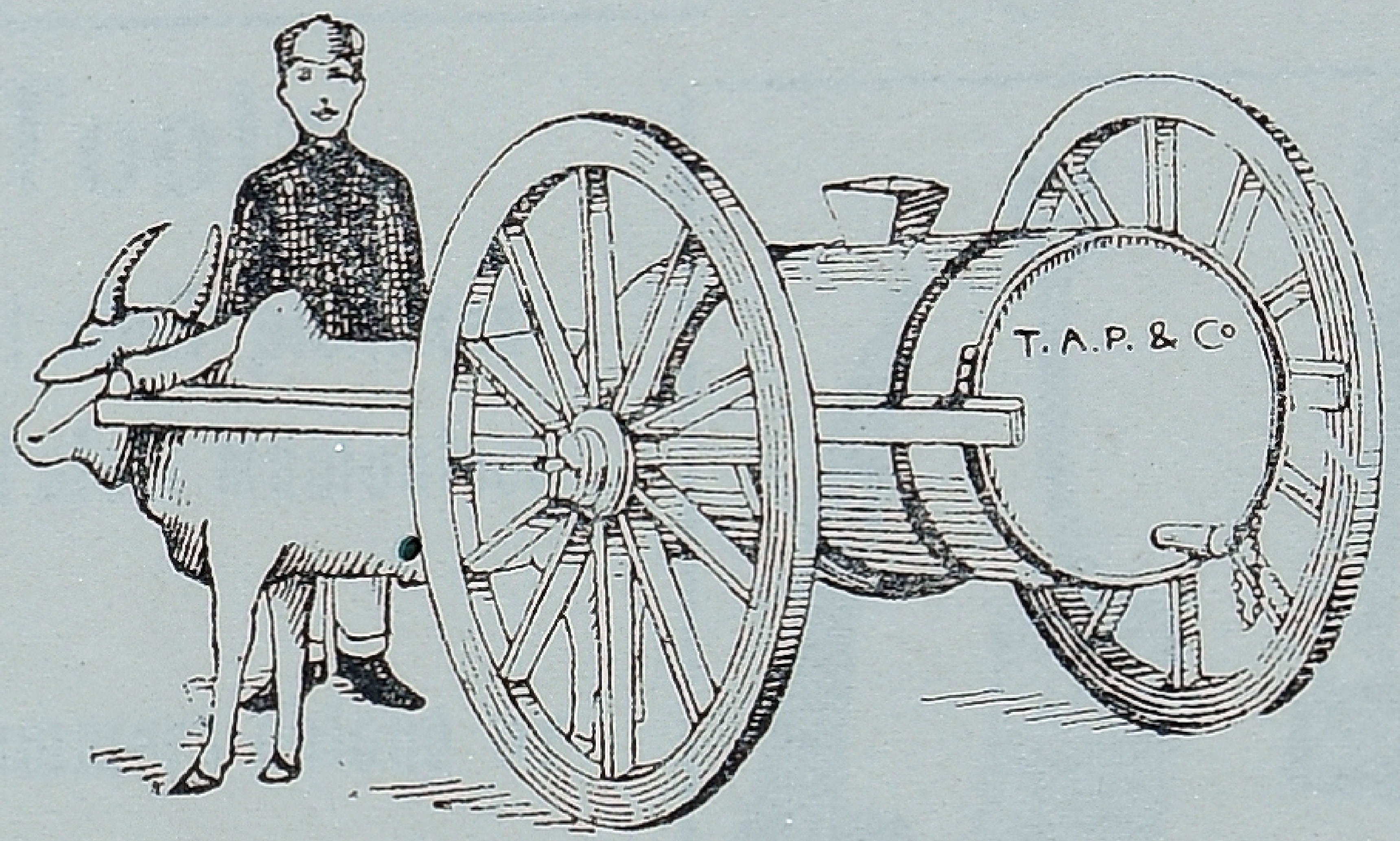

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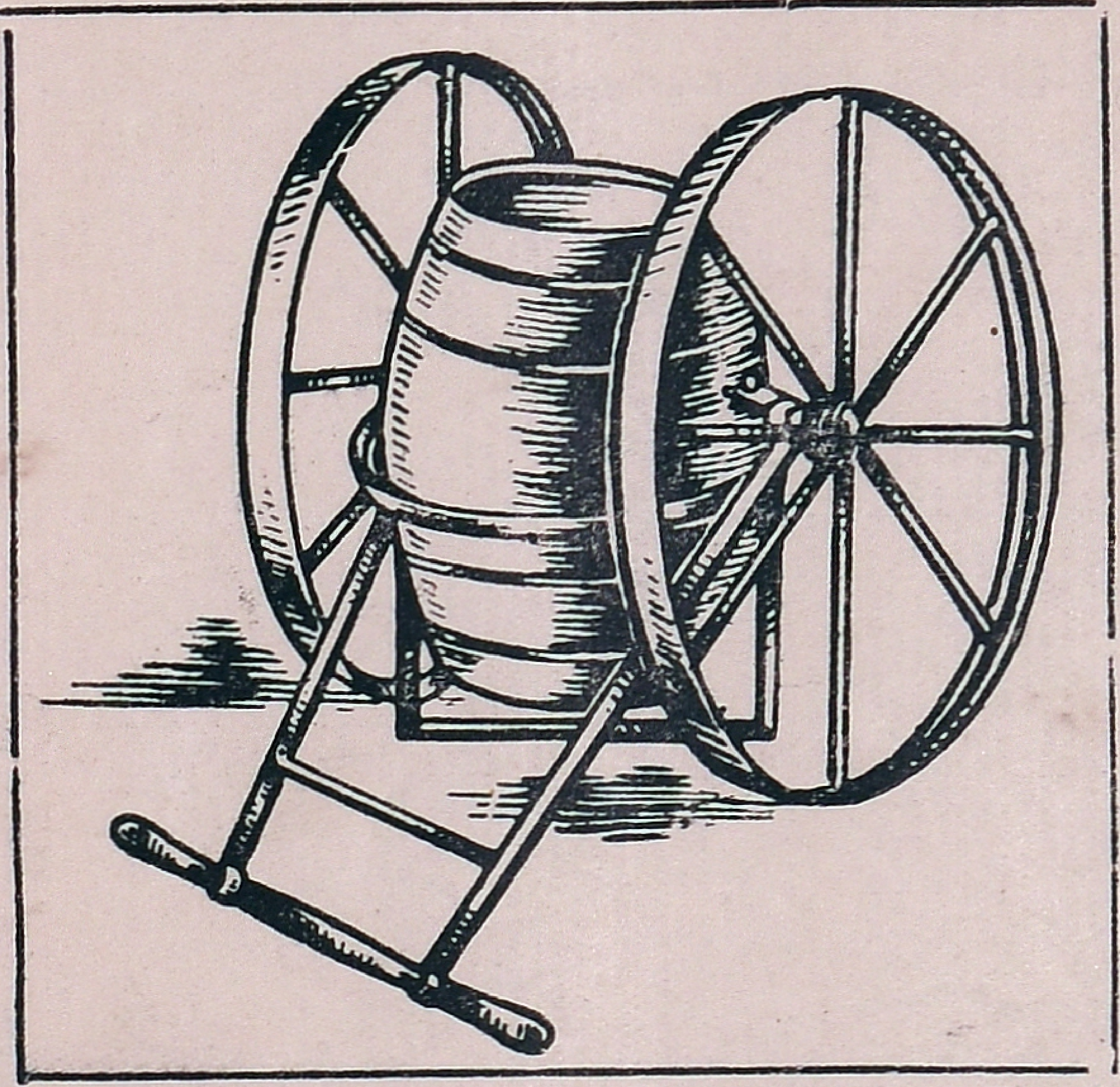

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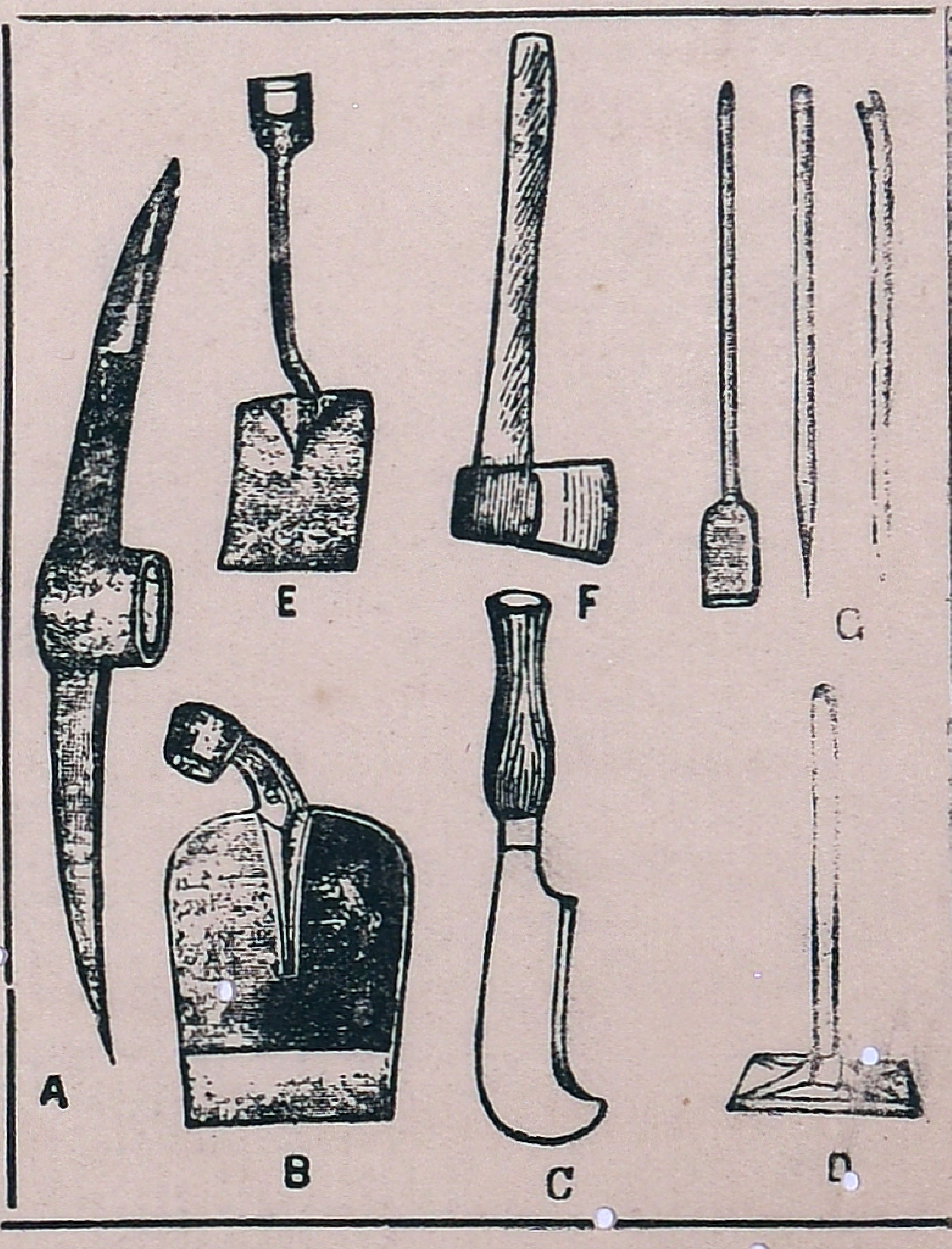

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